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TOXIC SUBSTANCES VS PUBLIC HEALTH

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March 19-20, 1980 **Helena, Montana**

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"THE HEALTH OF THE PEOPLE IS REALLY THE FOUNDATION UPON WHICH ALL THEIR HAPPINESS AND ALL THEIR POWERS AS A STATE DEPEND."

DISRAELI

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PREFACE

Threats to the public health subvert our social structures. Today a growing list of toxics incidents increasingly illicits a Pavlovian distrust among our citizenry. Agent Orange, Kepone, PBB, PCB, Love Canal symbolize ineffective government actions that have eroded public confidence.

While mindful that many chemicals are necessary, Dr. Irving J. Selikoff, a leading environmental health scientist, observes; "We have made a Faustian bargain with our chemical world. Now we have to learn enough so we can cut our losses." This conference has been organized to help us in this endeavor.

Our program has not been assembled for the benefit of its participants but rather to benefit the public its participants serve. We hope this spirit will prevail throughout these proceedings.

* * * * * *

PROGRAM

Wednesday, March 19 - John Bartlett, Presiding

Welcome - Governor Tom Judge

History Repeats Itself - Donald Healton

The Body Politic of Toxics Control - Edwin Chen

Cancer, Birth Defects, and Other Diseases Induced by Toxic Substances - Dr. David M. Young

Immunological, Neurological, and Behavioral Disorders - Dr. Frank Newman

Epidemiology of Toxic Substances - Dr. William N. Rom

Speaker Panel - Lt. Governor Ted Schwinden, Moderator

Thursday, March 20 - Gordon McOmber, Presiding

Montana's Dilemma - Jim Flynn

Congress and Toxic Substances - Christopher Harris

PCB Problem Case History

Symposium - Dr. John Howder, Moderator
FDA - John Vodneck and LeRoy Gomez
USDA - Dr. Joseph Blair
Mont. Dept. of Agriculture - Gordon McOmber
Mont. Dept. of Livestock - Dr. James W. Glosser
Mont. Dept. of Health & Environmental Sciences - Dr. Arthur C. Knight

Emergency Response Panel - Don Du Bois, Moderator

Panel Members
John Bartlett
Jim Wommack
Alvin Yorke
Gordon McOmber

Operation of a Hazardous Waste Disposal Facility - Jack Peabody

Hazardous Waste Disposal Panel - Roger Williams, Moderator

Panel Members
Kent Gray
Rich Reiter
Jon Yeagley
Jack Peabody

Monitoring and Testing - Dr. Eldon Savage

Monitoring and Testing Panel - Roy Bjornson, Moderator

Panel Members
Cal Campbell
Jim Swanson
Dr. Neal Whitney
Dr. Eldon Savage

Media Relations Panel - Vic Petralia, Moderator

Panel Members
Ruth Simerly
Alex Hansen
Edwin Chen
Rob Burnes

Legal Panel - Vern Sloulin, Moderator

Panel Members
Fred G. Nelson
Charles Brown
LeRoy Gomez

Summary and Recommendations - Dr. James W. Glosser

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OPENING REMARKS BY GOVERNOR THOMAS L. JUDGE

I welcome all of you to this important and timely seminar. It is my understanding that there are representatives here from all our western states and three Canadian provinces.

The purpose of our meeting together is first, to examine the role of toxic substances in our society today, and secondly, to begin to develop strategies which will enable us to better protect public health and safety with respect to these chemicals.

It is entirely appropriate that this first western region seminar be held in Montana -- for our state has been faced with the challenge of a far-reaching chemical contamination, the Billings PCB incident.

As a result of this experience we learned that chemical contamination does not stop at county, state, or even national boundaries, and that an incident in Billings, Montana can threaten public health in 16 other states and two foreign countries.

We also realized that a multitude of local, state, federal and even international agencies must respond to such a crisis. We recognized the critical need for better communication and coordination within departments and among agencies at all levels of government. One of my personal goals for this seminar is to develop a framework for improved communication and coordination in these matters.

Today, as you learn more about the general nature of toxic substances and their benefits when properly used and their potential danger to public health when improperly used, I also ask that you share your ideas as to how we can better meet that danger.

Tomorrow, a representative of my staff will be with you to discuss our strategy for improving our response capability. Several specific areas need to be addressed by all of us, including -- clearly identifying responsibilities -- keeping each other and the public informed -- determining the legal issues involved -- developing

adequate investigative and laboratory capabilities -- handling the disposal of contaminated products properly -- exploring possible indemnity or other relief for victims -- establishing continuing monitoring programs -- and evaluating all of these activities.

The task before us is enormous. Working together, however, this seminar can and should be the beginning of a significant cooperative effort by all of us to meet the challenge of safe chemical use in the modern world.

One of the fundamental and most important purposes of government is to protect the public from dangers over which they have no control. The increasing use of chemicals in our society mandates the unrelenting vigilance of federal, state and local agencies to assure the proper utilization of toxic substances and to guarantee the public health and safety. We must also assure that agriculture and other industries will be able to continue to take advantage of the benefits of chemical agents. This is an important challenge to all of us in government and industry, and I am confident that this seminar represents real progress toward our objective of establishing a fail safe system that will allow chemicals to work in necessary applications without endangering the public.

As Governor, I appreciate your attendance at this seminar, your expression of concern for toxic substance management, and your dedication to develop workable solutions to the problems associated with the use of chemicals.

I also commend the Montana Department of Health and Environmental Sciences for arranging this seminar and the agenda of outstanding participants. We have all the components for an informative discussion of essential public health issues,and I am convinced that the investment of your time and concern in the next two days will return the dividend of safer use of chemicals and improved protection to the people of our states and provinces.

Thank you.

#

HISTORY REPEATS ITSELF

I don't think I'll tell Doug Costle that this was a change for the better, but I'm glad to be here. As a matter of fact, it's unfortunate that he can't be here, because Doug has a message that I think is most appropriate to this group and I will, in fact, try to work into my remarks some of the things that I know he would have said. It's unfortunate that he could not be here, because his message is worth hearing.

I am, in fact, here as a result of some of his activities. He is one of the principles in the IRLG, the group that has been put together to try to bring the regulatory agencies who do get wrapped up in toxic chemicals into a body that will talk to each other, and that has been one of the long-range problems. It occurred to me, as I listened to Governor Judge, that you've already had a keynote speech. It seemed to me that he laid out exactly what this group ought to be about, so I don't really have to worry about that. What I do have to worry about is to try to lay an expansion on the framework that the Governor has already put forth.

The IRLG was concerned that we try to work with this group in order to try to take whatever comes out of here and expand that to something on a national basis and, as a matter of fact, they then asked me to come out here and gather what I could from this meeting and take it back and try to work it through the national organization, something that can spread from here to the rest of the country. Then I found out that Doug wasn't coming, and Leroy Gomez called me twenty-four hours back -- something like that -- and warned me that this might happen. So I grabbed an envelope, because I'm told that all great speeches occur on the backs of envelopes, and tried to dash out some things that I might say.

Presented by Donald C. Healton, Executive Director of Regional Operations, U.S. Food and Drug Administration, 5600 Fishers Lane, Room 13-65, Rockville, Maryland, 20857

I think the first thing that I would say is that environmental contamination with toxic chemicals is not a new problem. There is a tendency to think that the one that you've been involved with is the first time that anybody has had anything this big to deal with. Nor is it over with. The incident that we had here in the Northwest is not the last one.

And I thought that it might be useful to begin with perhaps a little history, keying only on those that I've personally been involved with, to run through some of the incidents that have hit us down through the years. because the first one that I had was in the late 1950's as a result of the improper use of a weed killer in the cranberry bogs of the Northeast. 3-amino-triazole was used too late in the season, after the fruit had set. And that's the only time in my whole service in the Food and Drug Administration that I ever got paid overtime. We worked twenty-four hours a day for well over two weeks in an attempt to do that kind of analytical work. That situation is no different today. It's the same thing that happened in the incident here. And yet that's more than twenty years ago, so there's really nothing new in that kind of involvement in chemical contamination.

The next one that I can recall in my career of being involved with was in 1966, when I first went to Kansas City. I'd been there three weeks and the boss was transferred and they told me I was in charge of the district office. Three days later, the State of Iowa developed a severe problem with DDT in eggs due to improper spraying in henhouses through about half of the state. So I found myself deeply involved for the first time in the administrative end of a contamination.

But as I look back on those, those were kind of small incidents in relation to some of those that I've been involved with since. In 1970, when I first arrived in Chicago, DDT had been essentially eliminated from current use. Everybody was heaving a sigh of relief because the levels of DDT in the fish in Lake Michigan were beginning to go down. But they never got to the point where the

fish were, in fact, commercially available, because by the time DDT got down to five ppm in the fish in Lake Michigan, PCBs had increased in those fish to the point that they were illegal for PCB contamination. So we never really got to a point where that crop was available. If you think it isn't fun to sit down with a group of sports fishermen and explain to them why they shouldn't eat the lake trout or the cove salmon that we, as a government, are paying $10 million a year to put into that lake, you haven't had any real fun. They don't take kindly to that sort of speechmaking. But we were able to work through that kind of a group and evolve a program to try to help manage the fishing resource there.

But that's a problem that has yet to go away. It's still there. It's there because of the continuing contamination of that lake and the fact that that particular chemical is so terribly persistent. And in an environment that widespread, I don't really have any feel for how long it's going to take. We know that that particular lake has a half-life in the water, or something like 95 years, so that the time to actually clean up Lake Michigan of this particular contamination is very, very long. We were working with the State of Michigan in that effort because actually, the hatcheries where the fish are being grown to put into that lake are in Michgan. In fact, they can't even sell the roe from the salmon for anything except bait because the roe in the salmon, even there in the hatchery, is almost two ppm.

So that's a continuing problem that they've been wrestling with for a long time. And while that one state was involved in this long, difficult kind of an environmental contamination, they were also visited with Polychlorinated Biphenyl. And this is a different kind of contamination. This is not one that was put into the environment by anyone on purpose. It was not used for the purpose that it got used for except by accident, and I think represents a different twist in the kind of problem that we have to deal with, because there was never any intent that

it be anywhere near the place where it caused the contamination. And I think we'll need to come back to that a little later.

But the State of Michigan was now deeply involved in two continuing environmental problems. The attempt to correct the PBB incident resulted in the tearing down of a lot of dairy barns and rebuilding of new ones with pentachlorophenol-treated lumber. And then they had to get rid of those barns, because they turned around and bought new cattle and put them in new barns and stored them over the winter in new barns, and then had to start all over again. And I think that's an example, also, of the kind of situation you can find yourself in, and there seems to be no end.

Other kinds of problems that we've run into over the years and, as a matter of fact, even after the Michigan incident, we found that farmers were still painting the inside of silos with waterproofing materials. And unfortunately, every once in a while, somebody finds a store of these waterproofing materials that's been stored away somewhere, and within the last two years, we've had an incident of folks in the middle of Indiana painting the inside of their silos with a PCB-containing waterproofing material, resulting in contaminated milk well above any levels that we were finding anywhere, with the exception perhaps of the lake trout of Lake Michigan.

Obviously, one of the environmental contaminants that you can't talk about the whole problem without bringing up the Love Canal or the whole problem of the burial of waste and that, again, is something I think we want to come back to. But another specific one that I was involved with and gets to another kind of source of the problem, and that is transformers containing PCB stored unused in a warehouse. The particular incident that I'm going to talk about a little bit, the warehouse was in Puerto Rico. It should be reasonably well isolated from the rest of the country. They had a fire. Obviously PCBs don't burn. The reason they use them is because they are fire retardant. But they do expand, and as these transformers got hot, the PCB, which is in liquid form, sprayed out of

the pressure release valves in the transformers, even though they were in storage, and proceeded to spray a large volume of tuna meal in bags which were stored in the warehouse. When the fire was over, there was a fair amount of testing done for bacteriological contamination of the product. Nobody thought to do any kind of pesticide testing because the product had never had that kind of a problem, and had been looked at before the fire, so all they looked at was whether or not the drying process had prevented bacterial contamination. Then they shipped the tuna meal back to this country as a part of salvaging the material from this warehouse fire, shipped it into the Southeast part of the United States and incorporated it rather widely in chicken food. Then the next thing we knew, we were getting reports from USDA's laboratories that they were beginning to find residues at the slaughterhouse level, and in tracing it back we finally found that we had this kind of a problem coming out of what should have been an isolated incident in Puerto Rico.

More recently, there was a situation in the State of Kansas in which a farmer looking for a cheap base to use for a backrub for his cattle bought some used oil from a salvage dealer, made up a backrub with lindane and put it out for his cattle to use. Unfortunately, it was essentially pure PCB that he bought from the salvage dealer. Another source of problems.

Then there is one that is going on today at this very minute in the State of Alabama and Tennessee. Reynolds Aluminum Company built a plant in which they were doing corrosive chemical work and wanted to protect the sheet metal, so they had it coated with a thick tar-like substance. It should be reasonably safe use of that material. After a few years, they decided that they didn't need that plant anymore, and they tore the plant down. In order to get rid of the material, they sold it to their employees. 150 different people bought salvage material from this building, took it home and used it for whatever they happened to want blacktar-coated sheet metal

for. A number of farmers have used that material to make housing for their swine, and we now have a significant problem that came out, again, of the USDA program of testing, this time testing because Japan requires that swine coming into their country be certified as being PCB free, and in doing that kind of testing, they discovered that the whole Northeastern part of Alabama and some parts of Southern Tennessee had a problem. It turns out that the pigs loved the taste of that tar, and when you go out and look at the building, as high as they could possibly reach they had removed all of that lovely black tar from those buildings, and the animals are right now at a rather high level.

There was consideration given to such corrective measures, for instance, as barring swine from Alabama from slaughter. That gets rather serious, and it gets down to the question that Doug Costle would have been talking about had he been here, and that is the dollar and cents of the business we're in, the economic cost of what happens as opposed to the economic cost of trying to fix it, and his suggestion that the right thing to do is to fix it, because the economic cost of not taking the right measures is even greater.

It seems to me that if you look back over this series of incidents that I've run through, here, there are two kinds of incidents. There is one incident in which the toxic chemical enters directly into humans or directly into the human food chain. There is the second kind of an incident in which it goes first into some kind of environmental situation, then moves into animal food, then moves into the animal, and then moves into the human. And it's that latter part, or latter approach, or latter situation that causes us the biggest problems. That is what happened here. And if there is any key to what makes these situations bigger and better, if you will, and that's when you get the contaminated animal food that itself moves in interstate commerce and just simply seems to spread this situation everywhere, and is the part that probably happens well before most of our surveillance systems are going to detect it. Most of the time, we find ourselves reacting

to a finding that is probably several months after the incident actually occurs, and is probably well down the road to nearing the insolvable when we finally find out about it.

There is a very unfortunate thing that is going on at the same time that we're having these kinds of problems, and that is that government of all kinds is held in terribly low esteem by the public in general, and there are two things, I think, that are happening out there. One is a general panic about chemicals, a real lack of understanding on the part of people about what chemicals are and do and a belief that they are being poisoned regularly. The second problem is that people generally have a belief that government is hiding things from them and that we are, in fact, frequently engaged in the cover-up of situations and trying to hide them from the public. And when those two things come together -- and certainly, if any of you have ever read the press accounts in Michigan of the PBB situation, that was the daily story in the newspaper. That was the daily story in a number of the newspapers in the Northwest, here, during this situation. And that is that we're hiding something from them. We're not telling the truth.

I think it comes from a couple of things, one being this terrible fear people have of being poisoned by things they can't see. The other is probably still fallout from Watergate. It seems to be traceable to that period in history, at least, and unfortunately, we seem to have a tendency to make that worse. To make the cover-up seem worse. We have a tendency to try to wait until we have all of the information because we don't want to tell people what's happening because they might panic. And that's read as a cover-up. Or we have the problem of mis-communication among ourselves, and one group thinking somebody else is hiding something from them. And that is seen as cover-up. Or we have a tendency, because a number of people in this business also have as their job to promote industry, that there is a fear that we're going to hurt somebody by releasing information. So we try to

hold it back and get more information and more information and build on the information until we can prove that somebody is really not responsible before we tell anybody about it. And that is seen as cover-up.

Somehow, we have to find a way to get around that communication problem, to get these things out in the open, at the same time, to help people to understand that they're not going to die from these things. Every time somebody says, "chemical in the food," it's not going to kill them. But it's going to take a while before people will begin to believe that, and the only way they will begin to believe that is if we, in fact, become more credible in the kinds of things we say to people.

So there are a number of steps that I think can be taken to try to do something about this, and it would seem to me that a number of things you have on your program here are, in fact, keys to what needs to be done. I think the first thing we have to do is do a better job of talking to each other. As I mentioned, I'm here as a representative of the IRLG, which is five federal regulatory agencies getting together and trying to talk to ourselves, and we find, in fact, that there are a number of folks that we should have been talking to that we had never met, people that we had never dealt with before who, in fact, have many of the same responsibilities and been concerned, and often complimentary capabilities that we could have used and should have been using for a long time.

I think the same thing is true in the states. I think the same thing is true between states. And I think we just have to get more open in the communication between us. Be less suspicious, in fact, of the motives of the other organization, and believe that, in fact, we're all in the business of trying to protect folks, and that if you find something, don't be so afraid to tell the other guy about it.

I think the next thing is that we have to begin to think in advance of what

we are going to do when the next one happens, because there is going to be a next one, and another one after that. And we might as well get ready for them. And I don't think many of us have really done much in the way of advance planning to think about how you do that. Advance planning includes not only the communication in talking to each other, but knowing, in fact -- sharing, if you will, mutually, what each other's responsibilities are so that if you come up with a situation, you know who to talk to. And I would hope that would come out of this meeting, is better knowledge of what the other person is capable of doing to help them.

It would seem also, then, that we need to begin to look for where are the susceptible weak points in the system that are going to lead to the most likely kinds of problems. And I would again submit that contamination of animal food is probably one of the prime targets, if you will, for widespread problems, and one of the places where we ought to be working harder and have probably done less in the past. We tend to think that it's not directly connected with our health because we don't eat that stuff. If we want to destroy a food product that isn't fit for human consumption, we feed it to our animals. And I think we need to re-think what it is we're feeding to animals, particularly those that are going to be used for human food later.

And then it would seem to me that we have to do a better job of figuring out what to do with the stuff after we find it. We know that PCB-contaminated transformers are a major source of that particular chemical in our environment. So you go out and you find them. And then what? The cost right now -- at least one disposal facility that I heard about -- the cost of disposing of a PCB-containing transformer is essentially equal to the cost of buying a new one. Folks aren't going to be overly eager to do that. So I think we have to spend some time thinking about how we go about the process of disposal. And even then, we don't really know how to get rid of the chemical after you get it out of whatever it happens to be

contaminating. So you get the PCB out of the transformer. What do you do with it? It's sort of like the radioactive waste that comes out of the nuclear pharmacies. It's great stuff; it does good things for us. But what do you do with it after it's done? I think we need to think through those ideas, think through what we are going to do with it, and share with each other what we are going to do with it and how we can work together to do that.

If there is one key that I would try to leave with you, that is a sense of urgency, because the next one is happening now.

#

THE BODY POLITIC OF TOXIC SUBSTANCES POLLUTION

It is a privilege to join with you today in examining what may well be one of the most important and difficult problems that confront our society: the pollution of our environment by toxic substances.

My talk, "The Body Politics of Toxic Substances Pollution," will examine the diverse forces that came into play in one such case, which began in Michigan in 1973, involving a chemical fire retardant called polybrominated biphenyl, or PBB. The incident has been described as the worst man-made agricultural disaster in U.S. history.

But first perhaps a bit of clarification is in order. Some of you may be wondering why a science writer for the Los Angeles Times, based in San Diego, is talking about an incident in faraway Michigan. Until four months ago, I was a resident of Michigan, where, as a reporter for the Detroit News, I wrote extensively about many facets of the PBB contamination. Last fall, a book I wrote about the disaster was published by Prentice-Hall.

The PBB accident began at the Michigan Chemical Corp., the maker of the synthetic chemical, which was used to render plastic consumer products heat resistant.

In the spring of 1973, company workers delivered poorly marked bags of PBB--instead of magnesium oxide, a livestock feed additive--to Michigan Farm Bureau Services.

The giant statewide co-op for a year blended thousands of pounds of PBB into livestock feeds, which were sold to unsuspecting farmers all over Michigan.

Presented by Edwin Chen, Science Writer, San Diego Bureau, Los Angeles Times, P.O. Box 85076, San Diego, California 92138

Animals throughout the state--cows, hogs, chickens, pets, even wildlife--ate contaminated feeds and died. But most did not. Instead, they ended up in the human food chain, often despite grotesque ailments: hair loss, elephant-like skin, hooves that curled upward like elf shoes, open sores, diseases that stopped responding to treatment and all sorts of breeding problems.

By autumn, farm families, accustomed to eating their own produce, began noticing unusual problems: fatigue, skin rashes, arthritis-like pain, loss of physical and mental capacity, loss of appetite, weight and hair loss, memory and judgment lapses. Some even developed deformed nail growths and scaly, leathery skin.

The accidental substitution of PBB for magnesium oxide, which also was made by Michigan Chemical, went undetected for 12 months. Any by then all nine million people in Michigan had been poisoned.

The most heavily contaminated were about 10,000 farm residents, many of whom today have more PBB in their bodies than the 1.5 million farm animals that were deemed unsafe for human consumption and therefore slaughtered. By the time the PBB crisis began fading some five years later, public confidence in government leaders and institutions had been profoundly shaken, and the farm community bitterly divided.

Even today, many continue to suffer from the accident's consequences. And another generation may pass before the full implications of the blunder are known.

But the Michigan tragedy is more than merely a frightening example of how a dangerous chemical can seep undetected into the human food chain, poisoning nine million people, causing illness and chaos.

What happened in Michigan is a sobering case study of how easily the machineries of government can be overwhelmed when serious environmental pollution

occurs to threaten public safety. The confusion often can be exacerbated, as it was in Michigan, by a desperate scramble among those responsible for the mixup to assign--and to avoid--responsibility.

To make matters worse, there were no state or federal programs, such as disaster emergency funds, to help the victims. The PBB accident did not involve an infectious disease or some "act of God," like a tornado, a flood or a dought. The thousands of affected farmers for the most part were simply left to their own resources, casting about for impossible solutions.

But the aim here is not to assign blame, given the benefit of that great clarifier, 20-20 hindsight. Rather, it may be instructive to take a closer look at the confusion and lack of coordination in Michigan that perhaps prolonged human exposure to a chemical that evidence now suggests may be carcinogenic.

What happened in Michigan may well occur again--indeed already has, right here in Montana and other Western states less than a year ago.

If there is a hero in the PBB disaster, it is a young farmer named Rick Halbert who, luckily, also is a chemist and one-time Dow Chemical engineer. Halbert's dairy farm near Battle Creek had ordered and received 35 tons of feed that turned out to have been highly contaminated. He had requested magnesium oxide in the feed because research had shown that the additive increases milk production and butterfat content.

It was the diligent -- and unrelenting--efforts of Halbert and his veterinarian that ultimately led to the identification of PBB as the mysterious killer ingredient in the feed.

Halbert had spent thousands of dollars in commissioning private labs to run tests on his feed after the Michigan Department of Agriculture and the Michigan State University labs and other public agencies such as the U.S. Food and Drug Administration and the National Animal Disease Lab in Ames, Iowa, were unable

or unwilling to help out.

After nealy a year, a federal scientist, George Fries of the National Pesticide Degradation Lab in Beltsville, Md., identified the PBB. Fries immediately notified his superiors at the U.S. Department of Agriculture who, in turn, called the FDA. But it took the FDA two weeks to alert the Michigan Department of Agriculture, which holds the responsibility of assuring the safety of food in Michigan.

And even though the problem was one that primarily affected dairy farms, the agriculture department did not alert its own dairy division for four days.

Three days after that, an article about the contamination appeared in the Wall Street Journal, which was how the Michigan Department of Public Health--and the public-- learned of the threat to public health.

Six more days went by before the agriculture department finally issued a statement that "only a few" farms were involved and that the state's milk was "cleaner, safer and more wholesome than at any time in history"--even as state inspectors were still fanning out across the state to collect milk samples for PBB analysis.

Shortly after the quarantines began, a bill was introduced in the legislature to condemn the poisoned animals, kill and bury them so the farmers can settle their debts, clean up and start again, while the state sought to recover the costs from the two companies responsible for the mixup. But the agriculture department, which drafted the legislation, was accused by some lawmakers of wanting to "bail out" Michigan Chemical and Farm Bureau Services. Governor William G. Milliken also wanted the companies to bear the costs.

The impasse lasted two months, leaving farmers in the meantime holding poisoned animals they were prohibited from selling. To avoid getting into such a bind, many other farmers simply avoided PBB detection. And that was easy

enough. Most of the 8,000 grade-A dairy farms were tested only at the owner's request, since, initially, state inspection efforts concentrated on the state's 54 dairy plants.

So many farmers simply dumped their sick animals into the human food chain rather than to be quarantined by the state without compensation and then have to hire a lawyer to sue the companies.

When the legislature finally passed a bill providing state land for a large burial pit for the condemned animals, the bill specifically said the state would not be obligated for the destruction and burial of animals. To have even ordered disposal of contaminated animals would have made the state liable, the Michigan attorney general had warned lawmakers.

The state health department, meantime, took four months to assemble a team of epidemiologists and physicians to visit the contaminated farms. By the time the results of its study were made known, the PBB crisis was a year old. The study compared 165 exposed persons to 133 presumed "controls"--but who also turned out to have been contaminated, a clear sign that the dimensions of the accident were greater than anticipated, although this was never explained to the public in a meaningful way.

The study concluded that no ailments were attributable to PBB and that many of the health problems found may have been due to "situational stress."

Meanwhile, PBB continued spreading. Even though Farm Bureau Services repeatedly cleaned its plant and feed mixing equipment, the chemical clung to everything it touched, thus contaminating all subsequent feeds that were mixed. Each time tests showed PBB was still present in its feeds, the co-op would again clean the plant--and then send out letters assuring farmers the feeds they were buying were "100% clean."

Farm Bureau Services also told the FDA it undertook two "massive" recalls of the original contaminated feed, and so the FDA did not follow its customary procedure of issuing a Class I recall, which is accompanied by widespread publicity. The feed recalls, it turned out, recovered 45 tons--about 10% of the contaminated feeds sold to farmers.

PBB also spread in another way. Many of the sick farm animals were sent to rendering plants, a standard dairy practice. There, the animals were processed and recycled as animal feed, which then was sold to farmers who had escaped the first round of contamination.

About six months after the accidental mixup came to light, the FDA lowered its tolerance levels--because of improved analytical capabilities. The action necessitated the condemnation of thousands more animals.

But Michigan Chemical and Farm Bureau Services, which had by then begun paying farmers for their losses, balked at further payments when these more stringent PBB guidelines were announced, after already having paid more than $10 million in property damages.

The companies relented after pressure from Governor Milliken, but they became drastically more niggardly in their settlements, since the PBB problem seemed to have no end in sight.

It is important here to note that the federal PBB guidelines were not established as any measure of animal health. In fact, these guidelines were no indication at all that an animal from which meat or milk was derived was even healthy. Indeed many farms that were contaminated but never quarantined suffered appalling losses.

These so-called low-level farmers, unable to obtain compensation from the companies, went to the press. And the media seized the story with a vengeance. When some of these angry farmers shot their ailing cattle rather than send them to the market, the bloody carnage was seen across the nation

on network television.

But on many other farms, animals simply died. And the farmers, confused over bureaucratic redtape, let the carcasses lie on the ground, unsure if they could bury the animals with impunity.

Soon restaurants and grocery stores all over the state began refusing to buy Michigan farm products, and many of them proudly proclaimed their boycott with hugh signs that read, for instance, "Western Beef," or "Milk from Iowa," and the like.

Legislative hearings were held. The governor appointed a five-member scientific advisory committee made up of nationally-known scientists to come up with recommendations as to some course of action. This is now two years after the feed mixup was first discovered.

But these actions did not make everyone happy. Many farmers, having gone back into business, were understandably chagrined to see PBB continue to dominate the headlines, which hurt their sales.

And so they began openly questioning the motives of the low-level farmers still seeking compensation. The controversy was fueled by senior agriculture officials who circulated dairy records that supposedly raised questions about the management skills of the still aggrieved farmers.

Then the scientific advisory panel, after holding hearings and private deliberations, stunned nearly everyone by recommending that the agriculture commission further--and swifty--reduce the federal PBB tolerance guidelines, saying that "the ultimate experiment in human disease--exposure of people--was in progress."

But the commission refused, defying the governor.

Amid this controversy came news from the state health department that the disaster's proportions indeed had been broader than had been suspected.

The department was involved in a national pesticides sampling study which involved the analysis of human breast milk.

Lab technicians decided to analyze some of the samples for PBB. Twenty-two of 26 Michigan samples had PBB, while every other sample--from New York, Ohio, Massachusetts and Connecticut--was free of PBB. A broader sampling confirmed that nearly everyone in Michigan had PBB in his or her body.

Into this atmosphere of uncertainty stepped Dr. Irving Selikoff, a well-known environmental scientist perhaps best known for having identified the hazards of asbestos. Selikoff had offered privately to come to Michigan--for free--to conduct an epidemiological survey. But he was rebuffed by aides to the governor and by a senior deputy agriculture director who said his department's concern was with "four legged, not two legged animals."

Selikoff was invited to do his study in mid-1976 after his 1974 offer was revealed by the news media.

His study, confirming what many farmers had been saying all along, found that nearly one-third of more than 1,000 farm and rural residents examined had suffered significant health problems.

His initial findings prompted the legislature to impose stricter PBB tolerance guidelines, this time with the state reimbursing farmers for their losses, as still more animals had to be slaughtered. Also enacted in the summer of 1977 was a testing program which continues to this date, having cost more than $20 million already, to inspect virtually each dairy animal in Michigan before it is sent to the market.

The program also identified about a dozen farms, including Rick Halbert's, which were so heavily contaminated that they may never be free of PBB and thus likely will have to be taken out of production, perhaps forever.

More recently, several suits filed by low-level farmers have been adjudicated. The rulings all have gone against the farmers.

But even before these not-unexpected decisions were reached, a Michigan congressman introduced legislation, still pending, that would create a board of compensation to administer a fund--raised from taxes levied against chemical makers, handlers and disposers--for victims of toxic substances pollution, taking into consideration the scientific uncertainties that make the effects of environmental poisoning difficult to measure, especially in a court of law.

Also as a result of the PBB disaster, Congress has passed into law a bill sponsored by Michigan Senator Donald Riegle to create a federal interagency strike force that could be mobilized quickly at the first sign of chemical contamination anywhere in the United States. The program has yet to be funded.

In Michigan, meantime, a Toxic Substances Control Commission was set up a year ago with the same idea in mind. The state further created a Toxic Substances Loan Commission to provide long-term, low interest loans to farmers affected by PBB.

A number of long-term health studies are underway, and clinics have been set up around the state to treat those who continue to show signs of PBB poisoning.

Selikoff's studies to date have revealed that the chemical can severely impair a person's natural ability to resist diseases. He also has encountered unusually high incidences of hysterectomies and respiratory birth defects that defy explanation.

In the labs, other scientists have found that even low doses of PBB can produce enlarged livers, birth defects, growth retardation and brain hernia among rats, mice and monkeys.

The National Cancer Institute is starting a two-year study to see if PBB is carcinogenic--a decision based on the finding of precancerous liver nodules

in rats fed a single PBB dose by toxicologist Renate Kimbrough at the U.S. Center for Disease Control.

School psychologists more recently have found that Michigan children with heavy PBB burdens scored markedly lower on performance tests than children with little or no PBB.

Health department statisticians have discovered that Michigan babies born during the heaviest years of contamination weighed less at birth than those born before or afterward.

The Michigan Chemical plant has been closed down and the company merged with the Velsicol Chemical Corp.

Many of the former PBB workers are still sick, some unable to collect unemployment pay because they are unable to work. Yet the state Department of Labor refuses to recognize "PBB syndrome" as a "compensable work-related injury."

Velsicol last year was indicted by a federal grand jury in Grand Rapids on charges of conspiracy to defraud a federal investigation of the PBB accident. The indictment said the coverup lasted for more than 2-1/2 years.

Shortly after the indictment, Velsicol settled most of the outstanding property damage suits filed by low-level farmers.

More than 100 personal injury suits are still pending.

Ultimately, the PBB contamination necessitated the destruction of some 40,000 dairy cows, 5,000 swine and sheep, more than 1.5 million other animals, as well as staggering amounts of food products--which were buried haphazardly around the state in dumps without the knowledge of state or federal authorities. By the time environmental monitoring began years later, leaching had long been underway. Rabbits, coyotes, ravens, gulls, starlings, rats, pheasants,

racoons, bear, fish and deer--all were contaminated. Total losses will exceed $1 billion.

The lessons of Michigan must not be forgotten. When such a tragedy strikes, government leaders must fully and promptly inform the citizens of the potential health hazards. Only then can the public insist upon the appropriate protective measures. No amount of affirmation or denial of health risks will suffice until independent research is done. Procrastination and wishful thinking must not replace good, sound science.

As you know, Michigan's PBB tragedy is hardly a rare incident. A December report by the U.S. Office of Technology Assessment said there were 243 episodes of chemical contamination of food in this country from 1968 to 1978 that were serious enough to have required governmental regulatory action.

The report said all the major incidents were marked by confusion and lack of coordination and poor communication between government agencies, state and federal.

The report, the first comprehensive examination of the problem, suggested that a nationwide food monitoring system be set up, making use of sophisticated, new chemical technology that can detect the presence of substances in miniscule amounts--down to a few parts per trillion.

But I'd like to leave you with this thought:

Our ability to measure chemicals, I believe, already far exceeds our current political abilities to manage or regulate them wisely.

We all want a safe food supply, of course. But before we establish such a new system that will generate vast amounts of new data, perhaps we need to take a hard look at the way our regulatory system manages the information it already has.

Thank you very much.

#

CANCER, BIRTH DEFECTS AND OTHER DISEASES INDUCED BY TOXIC SUBSTANCES

Introduction

Preparing for a scientific presentation allows one the opportunity to reflect on information in the literature and the interpretation of collected data. In this respect it is interesting to look at the plethora of reported adverse effects of toxic substances. One realizes that life can be viewed as a continuing saga of chemical and structural responses to stimuli, internal and external, some harmful and some beneficial. The internal stimuli consist of endogenous chemical mediators, hormones, neurotransmitted signals and other avenues of extracellular, cellular and subcellular communication involved in homeostatic mechanisms. External stimuli involve agents ranging from infectious micro-organisms to food stuffs to medicinal agents and polluted air. The total sum of responses to various external and internal stimuli result in major events in life referred to as "good health" (i.e. absence of disease), compromised health, aging or death or a combination thereof. So much for the philosophical aspects of the presentation. Before we consider some of the adverse effects of toxic substances, I think it is important to look at the funding of our health care delivery system in the United States in Table 1.

TABLE 1

U.S. HEALTH BUDGET AUTHORITY FY 81

$61.2 billion - Medicare and medicaid
10.3 billion - Discretionary health programs
3.6 billion - NIH
2.1 billion - HSA
1.1 billion - ADAMHA
134 million - NHSC
391 million - CDC
362 million - FDA
602 million - IHS
530 million - HRA

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About 85% of the projected health budget authority is for medicare and medicaid. The remaining $10.3 million is distributed among various health agencies. These figures compare to the total budget authority for the Department of Defense of $158.7 billion. What have these health dollars done for the United States population over the years? The United States mortality rates are seen in Table 2.

TABLE 2

U.S. MORTALITY RATES

1900	20.0 per 1,000
1940	10.8 per 1,000
1950	9.6 per 1,000
1975	9.0 per 1,000
1976	8.9 per 1,000

It has been said that discovery of effective polio vaccines saves the United States more each year than the entire medical research budget. In this presentation, I would like to cover four subspecialties of medicine seen in Table 3 which are interrelated in discussing the toxic effects or adverse effects of substances.

TABLE 3

Toxicology - study of poisons
(Toxic)
Teratology - study of abnormal development
and congenital malformations
(Teratogenic)
Oncology - study of neoplasms (tumors)
(Carcinogenic)
Genetics - study of heredity
(Mutagenic)

Toxicology

Long before the birth of modern pharmacology, Paracelsus who lived from the period of 1493 to 1541, observed that "All things are poisonous for there is nothing without poison. It is only the dose which makes the thing a poison."

All drugs and agents are toxic in overdosage and people and animal species vary greatly in their sensitivity to these substances. These four fields of study (toxicology, oncology, teratology, and genetics) together with pathology constitute the major fabric involved in investigating the adverse effects of toxic substances. Interestingly, many substances which are carcinogenic are also teratogenic and mutagenic. However, not all teratogens are considered carcinogenic or mutagenic. In Table 4 an inventory of chemicals reveals that over four million are registered with the American Chemical Society. Of these

TABLE 4

INVENTORY OF CHEMICALS

4,039,907	registered with the ACS
63,000	in common use
48,000	in U.S. Commerce
5,000	exceed 1 million lbs/yr
5,500	food additives
4,000	medical drugs
1,200	household products

3.4 million are organic and inorganic chemicals with defined structures. Approximately 1,000 new chemicals are introduced per year with over 2 million blends, mixtures and formulations in use today. Each person in the United States ingests 1 kg of food additives per year. During the past 50 years there has been an alarming increase in the production of chemicals. Synthetic organic chemical production has increased since 1935 and includes rubber processing chemicals, elastomers, tar and crude products of petroleum, plasticers and pesticides. Each of 80 generally distributed chemicals is produced in amounts greater than 100 million pounds annually. Another 25 are produced in excess of 25 million pounds per year. Some chemicals are extremely persistent in the natural environment and are highly resistant to breakdown and biological degradation. Hazardous wastes, defined by the EPA as those which are ignitable,

corrosive, reactive or toxic, account for 10 to 15% of all industrial wastes, estimated to be over 50 metric tons per year. The total has been growing by about 3% annually. About 12 million metric tons of hazardous wastes are produced by the chemical industry itself, but significant amounts are produced by virtually every type of industry. One example of the explosive nature of chemical development and resulting derivations is ethylene (Table 5). Note that many of these products are toxic, carcinogenic and/or mutagenic.

TABLE 5

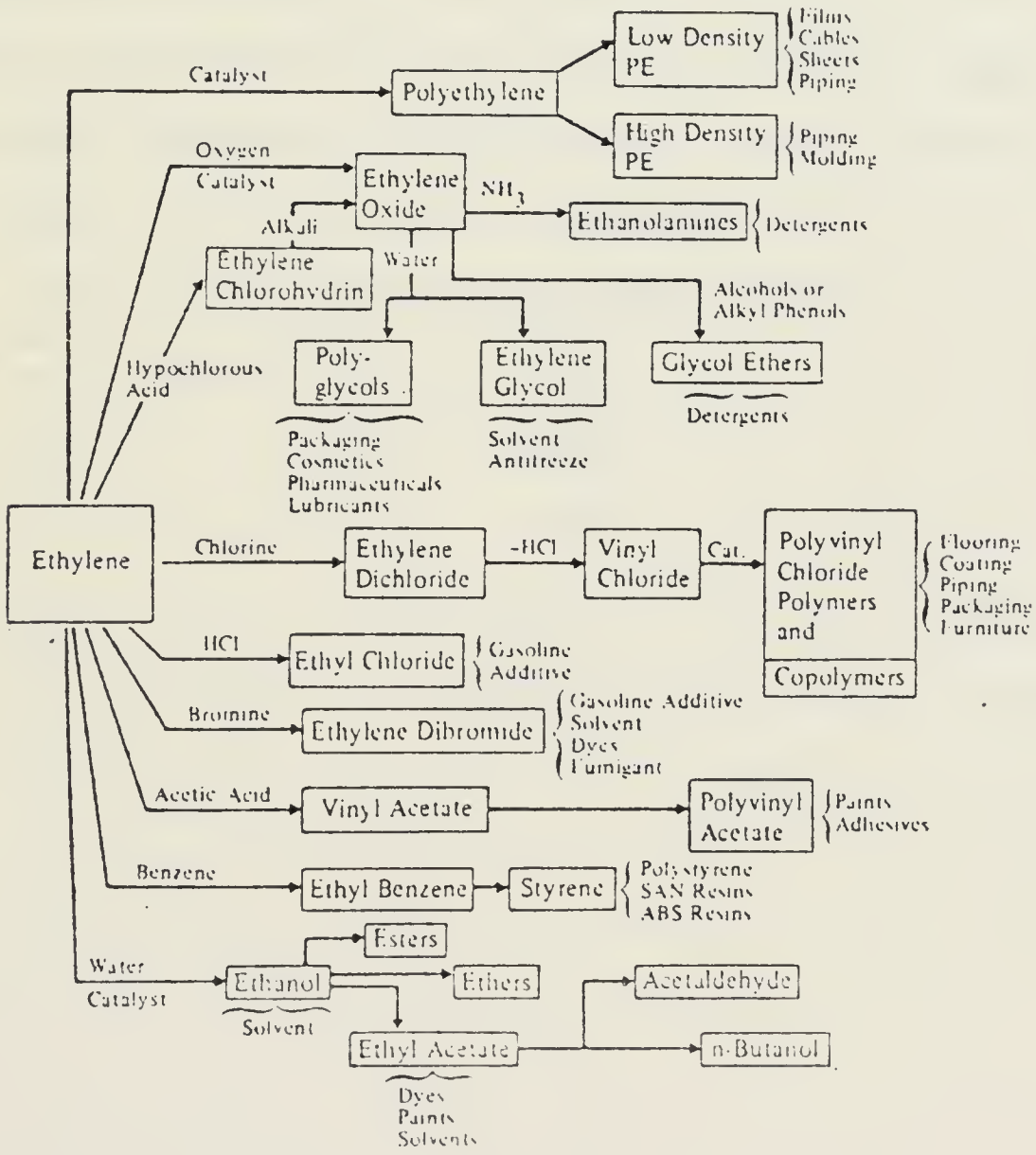

FIGURE 31 Uses of ethylene.

FROM: SCIENCE AND TECHNOLOGY A Five Year Outlook.
W. H. Freeman & Co. San Francisco, CA 1979

In parallel with this mushrooming development of chemical production has been federal efforts to regulate chemical uses and production. (Table 6)

TABLE 6

REGULATION OF CHEMICALS

1910 - Insecticide Act
1947 - Federal Insecticide, Fungicide and Rodenticide Act
1958 - Delaney Clause of the Pure Food and Drug Act
1976 - Toxic Substances Control Act

Federal programs assuring the safety of food supplies in the United States have had a long history starting with the Bureau of Chemistry of the Department of Agriculture. Legal standing was accorded on June 30, 1906 with the passage of the original Food and Drug Act. Further emphasis was added by the Food, Drug and Cosmetic Act of 1938. Government surveillance of food additives was tightened with the enactment of the 1958 Food Additives Amendment to the Food, Drug and Cosmetic Act of 1938. The Delaney Clause of the 1958 amendment states "No additive shall be deemed to be safe if it is found to induce cancer when injected in man or animal". This called for prior approval by the FDA of new commercially added food ingredients. The new legislation specifically exempted prior sanctions and substances in common use at the time from the regulatory definition of food additives. These substances became known as GRAS, an acronym for "Generally Recognized as Safe." The GRAS list compiled by the Food and Drug Administration contains about 600 items. In 1969 the President directed a full scale reevaluation of GRAS substances. Interestingly, artificial sweetening agents and food dye red no. 2 both were on the GRAS list and found later to cause cancer in laboratory animals.

Most recently the Toxic Substances Control Act (PL 94-469) was passed by the 94th Congress in 1976. It was the intent of this act that "adequate

data should be developed with respect to the effect of chemical substances and mixtures on health and the environment and that the development of such data should be the responsibility of those who manufacture and those who process such chemical substances and mixtures." Additionally, adequate authorities should exist to regulate chemical substances and mixtures which present an unreasonable risk of injury to the health or environment; and lastly, authority over chemicals, substances and mixtures should be exercised in such a manner as not to impede unduly or create unnecessary economic barriers to technological innovation while fulfilling the primary purpose of the Act. To aid in implementing the specific details of this Act, the secretary of DHEW announced the establishment of the National Toxicology Program on November 15, 1978. The National Toxicology Program consists of the following major federal agencies:

TABLE 7

NATIONAL TOXICOLOGY PROGRAM

NCI
NIEHS
NCTR
NIOSH
FDA

The National Cancer Institute, The National Institute for Environmental Health Sciences, The National Institute of Occupational Safety and Health, The National Center for Toxicological Research, and the Food and Drug Administration. The three specific goals for the program are: 1) to broaden toxicologic characterization of the chemicals being tested; 2) to increase the rate of chemical testing; and 3) to develop and begin to validate a series of protocols more appropriate for regulatory needs. The department-wide program is coordinated under the direction of Dr. David P. Rall also the director of NIEHS. Supporting the NTP program is the primary advisory group or the executive committee and

a board of scientific counselors. In addition there are avenues for public comments aiding in the planning and program balance. The FY 1979 operating budget for the NTP was $41 million dollars. The FY 1980 budget is $68.8 million dollars. The program segments of the NTP are grouped into two categories - 1) toxicologic research and testing and 2) coordinative management activities. The research and testing activities are responsible for development of contracts that perform indepth toxicologic chemical characterization in the following areas: genetic toxicology, carcinogenesis, chemical disposition, general toxicology, immunologic toxicology, neurobehavioral toxicology, pulmonary toxicology and reproductive and developmental toxicology. In carcinogenesis testing the NTP proposes to start 75 new chemicals on the lifetime carcinogenicity bioassays in FY 1980. These tests involve for each compound: 300 animals, 2-2 1/2 years of tests generating data on a weekly basis, 64 months for issuance of a report and a cost in excess of $400,000. In genetic toxicology testing, Phase 1 includes salmonella mutagenesis assays with a second test involving cultured mammalian cells. Phase 2 involves the use of the fruit fly which possesses inherent chemical metabolic activity and more precise information on the types of mutations induced. Testing capability is being established with a projected rate of 30 chemicals per year. The chemicals that are positive in Phase 2 systems will be subjected to testing in whole animal systems or Phase 3. In FY 1979 the NTP tested 201 chemicals for carcinogenic potential in lifetime rodent bioassays. Of these, 79 chemicals were started in 1979 and during the year tests were completed and reported on 95 chemicals. Under these tests, 49.5% were considered negative, 41% positive and 9.5% suspect.

In addition to conducting specialized experiments, the NTP will continue during FY 1980 to identify vital organ damage induced by chemicals utilizing a generalized toxicity screening test. The continuing priority in the NTP is the extrapolation of laboratory data to humans. Studies involve both in vitro

and *in vivo* laboratory tests. The NTP is also committed to investigating the role of the immune system in toxicologic characterization of chemicals. The following six parameters have been selected: 1) lymphocyte response to mitogens; 2) macrophage function; 3) antibody response to a T & B cell dependent antigen; 4) delayed hypersensitivity; 5) host resistant and 6) sensitivity to endotoxin. Reproductive and developmental toxicology is another area of concern. Teratology plans for FY 1980 represent a continuation of programs outlined in 1979. Testing of chemicals for teratogenic effects will continue at the rate of about 8 to 10 per year. In the management area, the following occurs: chemical nomination, chemical evaluation, and chemical selection. Finally, the NTP is involved in information collection, storage, retrieval and dissemination.

Parameters that are of importance in toxicologic testing are seen in Table 8.

TABLE 8

PARAMETERS IN TOXICOLOGIC TESTING

Dose
Route of administration
Frequency
Duration
Concentration
Pharmacokinetics (absorption, distribution, excretion)
Clinical signs and symptoms
Pathologic evaluation

The following case histories selected from the Tissue Reactions to Drugs Registry of the Armed Forces Institute of Pathology, Washington, D.C. will serve as examples to toxicities to chemicals obtained via different routes of administration:

1. Thirty-eight year old white male welder - cadmium toxicity
2. Twenty-nine year old white male drug addict - starch (talc) granulomas

3. Four and one-half week old male infant - hypernatremia and renal failure.

It is interesting to note that accidental poisonings are common and usually involve children; 70% of the reported cases in the United States involve children under 5 years of age. The leading cause of drug poisoning in children has been aspirin which accounts for one fifth of all the cases. Accidental poisonings are a significant problem in every community. There are more than four thousand fatal accidental poisonings each year in the United States. About one fourth of these are due to drugs. An increasing number of these are among drug addicts. The number of non-fatal poisonings is estimated to exceed 1 million per year or about one per 200 population. About one fifth of all the suicide deaths are attributable to drugs and about 90% of these are due to barbiturates. There are currently several hundred drugs in common clinical use in the United States.

The final area of discussion in the area of toxicology involves a new and emerging field of "epidemiologic toxicology". A review of past history reveals that epidemiologic evaluation of toxic insults in the environment has played a major role in elucidating cause and effect relationships. There are three main reasons why problems of toxicology have become so much more serious than in the past. First, very toxic chemicals are being introduced in large numbers; second, the growth of industrial organizations has reached a point where for the first time its products can significantly contaminate the biosphere in a particular geographic region; and third, systems of mass distribution now insure that any incident of toxicity will probably involve a large number of people spread over a wide area. These factors are vividly evident in the occurrences of PBB and PCB toxicity events discussed in detail by other speakers at this meeting. The following are examples of detection

of adverse effects of chemicals where 'Sherlock-Holmes' investigations in epidemiologic toxicology played a crucial role in elucidating and controlling the problem:

1. Radium dial painters - 1913-1924

In 1910 radium-activated luminous paint was used on more expensive German and Swiss watches. In 1913 a cheaper paint was developed in the United States which was water based using radium 226 and radium 228 in a zinc phosphor with trace metal to provide color. This paint was developed by Dr. Sabin A. von Sochocky, a Viennese who took a degree in medicine at Prague and later studied physics. He was instrumental as a physicist in developing the large radium company plant in Orange, New Jersey. This was the largest firm of its kind in America. Radioluminous dials were used in many areas besides watches. They were used during World War I chiefly for aircraft and submarine instrument panels. The use of this paint proved to be a fad in various markets of novelties including light switches and in various watch and clock dials. The period of collapse of the radium dial industry was between 1917 and 1924. Although only a 1,000 people worked at the radium extraction and dial painting plant in New Jersey, 5 had died from radium intoxication by 1925. Local dentists and physicians were seeing a number of different types of lesions and complaints including the following: jaw necrosis, osteomyelitis, osteosarcoma, aplastic anemia, fractures of bones, and joint pain. The first radium dial painter known to have died on September 12, 1922 was later exhumed in 1927 for analysis of total body radium. It was found that her body contained 48.4 micrograms of radium 226 which is approximately 5,000 times the accepted maximum body burden for an industrial worker using radioactive materials. The radium painters received piece work payment at approximately $1.44 per 24 dials painted. They could paint up to 250 dials

per day which would mean a potential of swallowing 1.75 grams of paint or 15 to 125 micrograms of radium. Epidemiologic studies performed over the past 50 years indicate that a number of deaths have continued which have originated from the New Jersey radium dial painting disaster. To date it appears that 108 deaths could be attributable to radium toxicity originating from Orange, New Jersey.

2. Thalidomide - 1958-1961

This represents one of the most devastating catastrophies in adverse effects of chemicals. Thalidomide was introduced in the late 1950's in West Germany, England and other countries as a tranquilizing agent and hypnotic. It was effective and seemed remarkably nontoxic. About 1960 scattered reports indicated that patients receiving this drug for a long time sometimes developed neurological disturbances. Shortly thereafter, there was an increase in the number of infants born with phocomelia, a shortening or complete absence of the limbs. In November of 1961 an astute pediatrician suspected an association between phocomelia and the ingestion of thalidomide by the pregnant mother. Subsequent investigations began in several countries. Thalidomide was withdrawn from the market at the end of 1961. In the United States the drug had not been approved by the FDA and was therefore never in general use. It was obtained by Americans traveling in Europe. The total number of infants throughout the world deformed by thalidomide are estimated to be in the neighborhood of 10,000. A major consequence of the thalidomide experience was the institution of improved procedures for screening new drugs.

3. Cranberry Scare - 1959

The secretary of HEW announced traces of a weed killer (aminotriazole) in cranberries headed for market. After a lengthy and heated 5 months of struggle, the industry received $10 million dollars in compensation from

the federal government and cranberries were back on the market.

4. Beer drinkers heart - 1965-1966

Patients with a history of consuming above average quantities of beer were hospitalized in Quebec with an unusual form of cardiomyopathy. The element cobalt was incriminated and was detected in high concentrations in beer as a foam stabilizer.

5. Diethylstilbestrol (DES) - 1941-1972

DES has been used in our environment over a period of nearly 40 years. It was prescribed routinely in the 40's and 50's for a wide variety of conditions including threatened abortions, preventing breast engorgement in mothers who didn't want to nurse, treatment of menopause symptoms, and prostatic cancer. The FDA approved DES for miscarriage prevention in 1947. It was also utilized in the cattle industry as a growth promoting stimulant. It is interesting to note as a side light that the animal drug industry is big business in the United States. A total of $1.2 billion dollars was spent on animal drugs in 1977. In the last four years, feed additives have constituted 67% of the total animal drugs purchased. Research studies performed in the 1950's indicated that DES might have some serious adverse effects however no definitive case against the drug was reported until the 1970's. It is now well established that children of women who were treated during pregnancy with DES have an increased risk of developing cancer or other problems with the reproductive system. It is estimated that 2 million DES daughters have squamous metaplasia and some have gross structural abnormalities, however luckily few have developed cancer. In a recent Bronx supreme court ruling, $500,000 was awarded to a 25 year old woman who allegedly developed vaginal cancer because of exposure in utero to DES which her mother had been given to prevent miscarriage. The patient,

Joyce Bichler, had undergone radical surgery including removal of the uterus, ovaries, two thirds of the vagina and the appendix at the Albert Einstein College Hospital. In 1974 she filed a suite against Eli Lilly and Company asking $5 million dollars. Eil Lilly was the major and early producer of DES. Eli Lilly is a defendant alone or with other DES producers currently in some 95 lawsuits. It is interesting to note that this is the first documented evidence of transplacental carcinogenic activity in humans. The cancer induction involves a hormone and a latent period of 18 to 25 years. In 1972, the use of DES as a food additive in food producing animals was banned.

6. Vinyl chloride - hepatic angiosarcoma - 1974

Since the first report of an association of hepatic angiosarcoma with vinyl chloride in the United States, other cases have been reported in Canada, England, Germany and France. An earlier report in 1971 indicated that vinyl chloride had carcinogenic potential in rodents. These reports in laboratory animals stimulated detailed and comprehensive epidemiologic investigations in humans.

7. Miscellaneous examples of association:

   A. Asbestos - lung cancer, mesotheliomas

   B. Tris-BP - fire retardant in children's sleepwear found to be carcinogenic in laboratory animals. Used during the years 1972-1977.

   C. PBB's - Michigan Disaster - 1974

   D. PCB's - Billings, Montana Disaster - 1979

   E. Chloramphenicol - blood dyscrasias in patients - 1960

   F. Saccharin, Cyclamate - human bladder cancer. Recent reports (Science March 14, 1980; NEJM March 6, 1980) indicate no association between use of artificial sweeteners and bladder cancer

   G. Hexachlorophene - suspected brain damage in young animals - 1971

H. Estrogen - endometrial cancer in postmenopausal women. Estrogens are considered by some to be tumor promoters (not initiators)

I. Monosodium Glutamate - neurological dysfunction

J. Pesticide use - Currently a $500 million lawsuit is pending in Triana, Alabama, over polluting streams with DDT. The suit is filed by 500 residents against Olin Corporation. This is the second $500 million suit against the company. A suit has been filed recently in Swan Valley (Condon area) of Montana incriminating the herbicide 2,4-D in abortions in women.

K. Paraquat in marijuana - pulmonary toxicity
Paraquat was originally prepared in 1882 but its herbicide properties were not discovered until 1959. It is a widely used effective herbicide which is highly toxic to man and animals. Paraquat is highly irritating to the eye and penetrates intact skin and produces dermal toxicity. Paraquat is a lung irritant and at lethal concentrations, death is delayed and associated with pulmonary edema, hemorrage and fibrosis. The pulmonary toxic properties of paraquat are probably related to the conversion of paraquat to a free radical, followed by a conversion to a long lived dihydoderivative which causes transformation of normal alveolar epithelial cells into fibroblasts. The pulmonary toxicity of paraquat assumed greater importance with the discovery that Mexican marijuana was contaminated with paraquat and smokers inhale 5% of the unburned herbicide directly into the target areas of bronchii and alveoli causing uncomfortable breathing and blood in the sputum. Following ingestion of the concentrated form of paraquat, the mortality rate is estimated to be 35% to 50%. To date over 500 human fatalities have resulted from paraquat poisoning.

Finally in the area of toxicology, we find that in a recent issue of Science (February 29, 1980) a federal judge ordered the EPA to decide if animal testing will be required on toxic and widely used chemicals. The Toxic Substances Control Act stated that within one year the EPA should decide whether to force testing on high priority chemicals such as toluene, zylene and ethylene oxide. EPA plans to publish guidelines this summer for testing and prefers to select compounds for testing after the guidelines are available. In another report in the same issue of Science the FDA was told by the Joint Commission on Prescription Drug Use to improve post marketing surveillance of approved drugs. This program would cost about

$10 million dollars per year or approximately the price of a freeway interchange in California. There is a need to survey and detect unexpected reactions. The FDA receives about 10,000 reports per year from drug companies on adverse reactions which are required by law and 2,000 per year from physicians which is referred to as spontaneous reporting.

Oncology (Cancer, carcinogenesis)

A definition for cancer is seen in Table 9.

TABLE 9

CANCER = MALIGNANT DISEASE; NEOPLASIA; TUMOR

> "A collection of diseases characterized by new growth which is due, in part, to an abnormality within the involved cells and which is not responsive to the control mechanisms of the body."

It is becoming further understood that carcinogenesis is a multi-step process involving both initiation and promotion. Initiation of tumor formation is the production of an irreversible cellular change which is a necessary, but not sufficient condition, for the development of cancer. The tumor promoter is considered to be noncarcinogenic by itself. The phenomenon of tumor promotion has been known for almost 40 years. Some carcinogens have the ability to both initiate and promote tumor formation. Promotion is a process which is considered to be reversible. If the exposure ceases before the cells gain the ability to multiply in the absence of the promoter, then tumor formation may be avoided. Promoters are known to stimulate cell division although this effect cannot account by itself for tumor formation. Many substances have been implicated in the cause of cancer (Table 10). Viruses have been thought to play an

TABLE 10

POTENTIAL CAUSES OF CANCER

Chemicals
Viruses
Radiation
Genetic traits

etiologic role in a number of cancers. The first break came with the discovery in 1908 by Ellermann and Bang in Copenhagen; they transmitted chicken leukemia by cell free, filered extracts and demonstrated the viral etiology of this disease. In 1911 Peyton Rous in New York transmitted a solid tumor, the chicken sarcoma by filtrates.

Chemical carcinogenesis was discovered in man long before it could be demonstrated in animals. In 1775 cancer of the scrotum was recognized as an occupational disease of chimney sweeps and prolonged exposure to soot was presumed to be the cause. It was not until 1915 that cancer was produced experimentally by applying coal tar to animal skin. The principal groups of chemical carcinogens include the following: polycyclic hydrocarbons, aromatic amines, azo dyes, nitrosamines, urethane and alkylating agents. It has been estimated that at least one third of all cancer deaths are attributable to known environmental agents and are therefore probably preventable. Other reports indicate an incidence as high as 80-90% of environmental caused cancers.

Approximately 20% of the 70,000 chemicals in commercial use examined by the EPA thus far are suspected carcinogens. The estimate is that one third of the 1500 active ingredients of registered pesticides are toxic and that one fourth are carcinogenic. Some of the carcinogens are listed in Table 11. The NIOSH has compiled a list of 28,000 toxic chemicals, 2200 of which are classified as suspected carcinogens. As of June 1979, researchers estimated that 8000 widely used chemicals remain unscreened for carcinogenicity testing. Working against this backlog, NCI has committed $91 million dollars since 1972 with annual expenditures rising from $8 million to $30 million in 1980.

Carcinogenesis studies carried out with reasonable numbers of animals are statistically significant only when the observed incidence of induced

Table 1 Chemical or industrial processes associated or strongly suspected of being associated with cancer induction in humans, and comparison of target organs and main routes of exposure in animals and humans[a, b]

Chemical or industrial process	Main type of exposure[c]	Target organs—humans (main route of exposure)[d]		Target organs—animals (route of exposure)	
1. Aflatoxins	Environmental, occupational[e]	Liver	(Oral, inhalation)[e]	Rat	Liver, stomach, colon, kidney (oral)
				Fish, duck, marmoset, tree shrew, monkey	Liver (oral)
				Rat	Liver, trachea (intratracheal), liver (i.p. injection)
				Mouse, rat	Local (s.c. injection)
				Mouse	Lung (i.p. injection)
2. 4-Aminobiphenyl	Occupational	Bladder	(Inhalation, skin, oral)	Mouse, rabbit, dog	Bladder (oral)
				Newborn mouse	Liver (s.c. injection)
				Rat	Mammary gland, intestine (s.c. injection)
3. Arsenic compounds	Occupational, medicinal, environmental	Skin, lung, liver[e]	(Inhalation, oral, skin)	Mouse, rat, dog	Inadequate, negative (oral)
				Mouse	Inadequate, negative (skin, s.c., i.v. injection)
4. Asbestos	Occupational	Lung, pleural cavity, gastrointestinal tract	(Inhalation, oral)	Mouse, rat, hamster, rabbit	Lung, pleura (inhalation and intratracheal)
				Rat, hamster	Local (intrapleural)
				Rat	Local (i.p., s.c. injection)
					Various sites[e] (oral)
5. Auramine (manufacture of)	Occupational	Bladder	(Inhalation, skin, oral)	Mouse, rat	Liver (oral)
				Rabbit, dog	Negative (oral)
				Rat	Local, liver, intestine (s.c. injection)
6. Benzene	Occupational	Hemopoietic system	(Inhalation, skin)	Mouse	Inadequate (skin, s.c. injection)
7. Benzidine	Occupational	Bladder	(Inhalation, skin, oral)	Mouse	Liver (s.c. injection)
				Rat	Liver (oral), Zymbal gland, liver, colon (s.c. injection)
				Hamster	Liver (oral)
				Dog	Bladder (oral)
8. Bis (chloromethyl) ether	Occupational	Lung	(Inhalation)	Mouse, rat	Respiratory tract (inhalation)
				Mouse	Skin (skin), local, lung (s.c. injection)
				Rat	Local (s.c. injection)
9. Cadmium using industries (possibly cadmium oxide)	Occupational	Prostate, lung[e]	(Inhalation, oral)	Rat	Local, testis (s.c. or i.m. injection)
10. Chloramphenicol	Medicinal	Hemopoietic system	(Oral, injection)	No adequate tests	
11. Chloromethyl methyl ether [possibly associated with bis (chloromethyl) ether]	Occupational	Lung	(Inhalation)	Mouse	Initiator (skin), lung[e] (inhalation), local, lung (s.c. injection)
				Rat	Local[e] (s.c. injection)
12. Chromium (chromate-producing industries)	Occupational	Lung, nasal cavities[e]	(Inhalation)	Mouse, rat	Local (s.c., i.m. injection)
				Rat	Lung (intrabronchial implantation)
13. Cyclophosphamide	Medicinal	Bladder	(Oral, injection)	Mouse	Hemopoietic system, lung (i.p., s.c. injection), various sites (oral), bladder[e] (i.p. injection)

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Table 1 *(continued)*

Chemical or industrial process	Main type of exposure[c]	Target organs—humans (main route of exposure)[d]		Target organs—animals (route of exposure)	
				Rat	Mammary gland (i.p. injection), various sites (i.v. injection)
14. Diethylstilbestrol	Medicinal	Uterus, vagina	(Oral)	Mouse	Mammary (oral)
				Mouse	Mammary, lymphoreticular, testis (s.c. injection, s.c. implantation), vagina (local)
				Rat	Mammary, hypophysis[e], bladder (s.c. implantation)
				Hamster	Kidney (s.c. injection, s.c. implantation)
				Squirrel, monkey	Uterine serosa (s.c. implantation)
15. Hematite mining (? radon)	Occupational	Lung	(Inhalation)	Mouse, hamster, guinea pig	Negative (inhalation, intratracheal)
				Rat	Negative (s.c. injection)
16. Isopropyl oils	Occupational	Nasal cavity, larynx	(Inhalation)	No adequate tests	
17. Melphalan	Medicinal	Hemopoietic system	(Oral, injection)	Mouse	Initiator (skin), lung, lymphosarcomas (i.p. injection)
				Rat	Local, mammary (i.p. injection)
18. Mustard gas	Occupational	Lung, larynx	(Inhalation)	Mouse	Lung (inhalation, i.v. injection), local (s.c. injection)
19. 2-Naphthylamine	Occupational	Bladder	(Inhalation, skin, oral)	Hamster, dog, monkey	Bladder (oral)
				Mouse	Liver, lung (s.c. injection)
				Rat, rabbit	Inadequate (oral)
20. Nickel (nickel refining)	Occupational	Nasal cavity, lung	(Inhalation)	Rat	Lung (inhalation)
				Mouse, rat, hamster	Local (s.c., i.m. injection)
				Mouse, rat	Local (i.m. implantation)
21. N, N-Bis (2-chloroethyl)-2-naphthylamine	Medicinal	Bladder	(Oral)	Mouse	Lung (i.p. injection)
				Rat	Local (s.c. injection)
22. Oxymetholone	Medicinal	Liver	(Oral)	No adequate tests	
23. Phenacetin	Medicinal	Kidney	(Oral)	No adequate tests[f]	
24. Phenytoin	Medicinal	Lymphoreticular tissues	(Oral, injection)	Mouse	Lymphoreticular tissues (oral, i.p. injection)
25. Soot, tars, oils	Occupational, environmental	Lung, skin (scrotum)	(Inhalation, skin)	Mouse, rabbit	Skin (skin)
26. Vinyl chloride	Occupational	Liver, brain,[e] lung[e]	(Inhalation, skin)	Mouse, rat	Lung, liver, blood vessels, mammary, Zymbal gland, kidney (inhalation)

[a] From Tomatis et al 1978. *Cancer Res.* 38:877–85.
[b] The chemicals or industrial processes listed in this table should not be taken as a thorough compilation of known human chemical carcinogens. They reflect only those chemicals which have been evaluated by the IARC Monograph Programme until now.
[c] The main types of exposure mentioned are those by which the association with cancer has been demonstrated. Exposure via the general environment may also occur.
[d] The main routes of exposure given may not be the only ones by which such effects could occur.
[e] Denotes indicative evidence.
[f] The induction of tumors of the nasal cavities in rats administered phenacetin has recently been reported.

tumor is greater than 5%. Therefore a negative result in an animal bioassay for carcinogenicity does not necessarily mean that the chemical is safe. For instance consider an animal test in which 100 rodents are fed a chemical. If none of the rodents develop a tumor, then we are 99% confident that actual incidence of tumor that might be caused by the chemical is less than 4.5%. An environmental carcinogen causing cancer in 1% of one hundred million people would result in a million cases of cancer. Detection of a chemical causing cancer in only 1% of the test animals would require the use of 10,000 rats or mice and would be too costly.

Factors affecting the development and growth of cancer are seen in Table 12.

TABLE 12

CANCER AND RELATED FACTORS

Threshold	Prevention
Synergism	Treatment
Epidemiology	Risk
Detection	Genetics
Environment	Viruses
Latent Period	

Induction time plays an important role in the development of cancer. There is a strong linear correlation between time, tumor size, number of cancer cells and number of cancer cell doublings. For instance a tumor at 20 cell doublings is about 1 mm in diameter after 6.75 years of growth and contains 10^6 cells. Correspondingly at 30 doublings, 1 cm in diameter, 10 years of growth and 10^9 cells; and 40 doublings, 10 cm in diameter (1 kg), 13 years of growth and 10^{12} cells.

The United States cancer research history is seen in Table 13.

TABLE 13

U.S. CANCER RESEARCH

1927 -	Cancer Reward Bill
1928 -	Federal Cancer Research Bill
1930 -	National Cancer Survey Bill
1935 -	Social Security Act, Public Health Title (VI)
1937 -	National Cancer Institute Act
1938 - 39 -	Construction of the National Cancer Institute
1944 -	The Public Health Service Act
1971 -	National Cancer Act of 1971

Cancer organ target sites frequently affected are seen in Table 14.

TABLE 14

OCCURRENCE OF CANCER BY SITE

Men	Women
lung	breast
prostate	colon
colon	lung
bladder	uterus
stomach	ovary

The connection between smoking and lung cancer was first observed in retrospective studies reported in 1939. In 1964, the Surgeon General report stated the association between cigarette smoking and several forms of cancer, coronary heart disease and chronic lung disease. This fact has now been well established. Some of the costly adverse effects of smoking are seen in Table 15.

TABLE 15

ADVERSE EFFECTS OF SMOKING

Diseases -	Cancers of throat, lung, mouth, pancreas, urinary bladder; emphysema; peptic ulcers; decreased fertility; stillbirths; spontaneous abortions.
Illnesses -	Cost to American public of over $8 billion annually; lost earnings due to illnesses and deaths of $18 billion annually.
Fire damage-	Smoking-caused fires account for 47% of all fire-related injuries and deaths with a damage cost of $170 million annually.

The controversy and funding for and against smoking is evident in Table 16.

TABLE 16

"THE TOBACCO CONNECTION"

Federal Funds	
Anti-smoke campaign (NCSH)	$ 2 million
Subsidies to Tobacco Growers	80 million
Indirect subsidies (medicare, VA Hospital)	1 billion
Cancer Research (NIH)	872 million
Tobacco Industry	
Advertising	$400 million
Research (CTR)	40 million
American Cancer Society	
Research	$200,000.00

Another area of interest is the relationship between aging and cancer. It is known that the probability that a human may develop cancer during the next five years is only one in 700 if he or she is age 25 but is 1 in 14 if he or she is 65 years old or older. Overall, one out of every four Americans will develop cancer during their lifetime. On the average, 50% of patients with cancer die of the disease even if the best therapeutic modalities are applied. Present studies indicate that curative results have been achieved in 10 of the approximately 100 neoplastic disorders in humans.

Damage to DNA appears to be the major cause of most cancer and genetic birth defects and may contribute to aging and heart disease as well. Somatic mutation in DNA of body cells may give rise to cancerous cells by changing normal cellular mechanisms coded for in the DNA that control and prevent cell multiplication. Environmental factors are a major concern in the development of cancer. For example, in Japan there is an extremely low rate of breast and colon cancer and a high rate of stomach cancer; whereas in the United

States, the reverse is true. When Japanese immigrate to the United States, within a generation or two, they show the cancer site and incidence of citizens of the United States. It is well known that there may be a 20 to 30 year latent period between initial exposure to a carcinogen and the appearance of cancer.

It is well accepted that most carcinogens are also mutagens. This is the basis of the salmonella mammalian liver test for detecting chemical mutagens. There are a number of chemicals initially detected as mutagens which have been found to be carcinogens. These include the following: 1) furylfuramide, a food additive used extensively in Japan, 2) ethylene dichloride, 3) ethylene dibromide, which is widely used (400 million lbs. per year in the United States) as an industrial chemical and gasoline additive, 4) the flame retardant tris-BP which was used in children's polyester pajamas.

A number of carcinogens are found to be naturally occurring in our environment. We know that a number of plant materials contain, and certain molds produce, carcinogenic substances ranging from very high to very low activity. Some of these include the following: 1) safrole is present in sassafras; 2) capsaicin in chili peppers; 3) parasorbic acid in mountain ashberry; 4) capechin in certain vegetable extracts used in the tanning of leather; 5) cyasin in cycad nut consumed by a large population on the island of Guam; 6) monocrotalin in a shrubbery used in South Africa for preparing medicinal tea; and 7) cotinine in unburned tobacco. There are compounds produced from certain molds; aflatoxin is a product of metabolism of the common yellow mold, Aspergillus flavus which is probably the most potent carcinogen known. Fifty years ago it would be hard to find more than a half-a-dozen spices on sale in a grocery store. Some supermarkets now carry well over 50 on their shelves. We are only beginning to explore the toxic and carcinogenic potential of spices. Herb teas are in wide use in the United

States today and their biological and toxicologic effects are virtually unknown and remain apparently uninvestigated.

Teratology

The process of embryogenesis is extremely complex. There is a finely balanced interplay of cell proliferation, differentiation, migration, and organogenesis representing the final sequence of programed events. Interference in this complex process resulting in adverse changes depends upon timing. Since events in embryogenesis depend on prior events, a temporary delay or defect in development may affect a large group of cells or throw development out of phase with time. Certain chemical agents can effect the somatic cells of a developing embryo in such a way that defects of one or another organ system are produced. If the embryonic germ cells escape damage only the individual will be effected. Thus most congenital anomalies are not hereditary. Teratogenic research has been stimulated by the following accidental discoveries: 1) the increasing awareness of the biological effects of radiation revealed about a half century ago that pelvic irradiation during pregnancy could result in the birth of a malformed child; 2) the discovery in Australia in 1940 that an unusually large number of blind and/or deaf children were born following a mild virus disease (rubella); 3) finally, the thalidomide disaster of 1960 to 1962 showed that an ordinary drug could produce fetal malformations on a large scale. A number of teratogenic agents meet the criterion of selective toxicity for the fetus. This means that they interfere directly with fetal development at doses that do not disturb placental function. Most teratogenes do not impair placental function. Most teratogens administered at high doses or early in embryonic development can cause fetal death followed by abortion or resorption of the fetus. Some genetic malformations do not fall under the heading of teratogenesis because

the basic defect is primarily in the zygote, in the germ cells, as well as all the somatic cells of the affected individual. Examples would include mongolism and chondrodysprophy which are malformations whose causes appear to be primarily genetic. Most congenital malformations are not associated with any obvious abnormalities of the chromosomes and are not inheritable. This is because teratogens need only to cause a transient disturbance of cell function during a short critical period or organogenesis whereas an inheritable alteration in a cell line is absolutely required in mutagenesis and carcinogenesis. There are sharply limited critical time periods during fetal development in which specific malformations can be produced. It has been well known that vitamin deficiencies and other specific nutritional alterations have teratogenic effects producing congenital malformations. Hormone deficiencies or excesses can prove to be teratogenic themselves. There are 10 viruses known to produce teratogenic effects in humans and animals. Because of the genetic complexity of man there are immense possibilities for mutation. Individual genetic diseases occur infrequently but there are very many of them, at least 1500 different diseases considered to be of genetic origin.

In 1972 Renwick reviewed the current literature on spina bifida as well as the occurrence of late blighted potatoes and was able to show that in areas where the climate was relatively mild and moist the incidence of late blighted potatoes was great and spina bifida occurred more frequently than elsewhere. He proposed a teratogenic action of substances in potatoes with late blight and estimated that spina bifida defects could be reduced by 95% as a result of total avoidance of potatoes during pregnancy.

Considerable research remains to be performed in order to increase our knowledge base in the area of teratology. There are numerous man-made

chemicals and spontaneous occurring substances in our environment yet to be tested for teratogenic effects.

Summary and Conclusion

Toxic diseases, as other pathologic conditions, freely cross all socioeconomic barriers. They have been with the human population since the beginning of time when Adam ate the first forbidden fruit. How many more forbidden fruits and substances will we find in our man-made environment?

Although there are numerous 'unknowns' in the present study of toxic effects of various agents, there are some new and novel related findings which are most intriguing. These include: 1) clinical trials of interferon in cancer; 2) cancer cells have little or no manganese superoxide dismutase (MSOD), the enzyme that seems to protect the nucleus and mitochondria from superoxides; 3) fibronectin, a phagocytosis promoting glycoprotein, plays several crucial roles in the body including (a) reversing cells' malignant growth by preventing metastases, (b) opsonizing foreign particles and (c) promoting removal of alien proteins; 4) the use of tumor marker analysis for detection and monitoring anticancer therapy (CEA, AFP, PAP and etc.); 5) production of recombinant DNA substances for future therapy; and, 6) development and use of new techniques to detect fetal abnormalities (i.e. amniocentesis).

In concert with these rays of hope through research, there are many definite needs lurking in the shadows of benign neglect. Accordingly, in conclusion, a plea is made for directing our attention, talents, and energies in the following areas:

1) developing better, cost-effective, accurate systems for detecting carcinogens, mutagens and teratogens in our environment;

2) maintaining accurate records of experimentation and epidemiologic surveillance so that powers of observation are receptive to that "serendipitous finding";

3) forming effective systems of data, storage, retrieval, dissemination and communication on a state, region, national and international basis;

4) establishing priorities for testing chemicals and agents and minimizing human exposure to known toxicants;

5) focusing research investigations on metabolism of toxic agents to detect how cells convert non-carcinogens (mutagens, toxicants, teratogens) to carcinogens and visa versa;

6) investigating the interactions of chemicals and their metabolites in intermediary metabolism to determine subcellular manifestations and mechanisms of adverse effects.

#

IMMUNOLOGICAL, NEUROLOGICAL AND BEHAVIORAL DISORDERS IN RELATION TO TOXIC SUBSTANCES

Introduction

The topic of this seminar "Toxic Substances vs Public Health" is (1) timely with regard to certain articles which have appeared in the popular press over the past two weeks, (2) highly appropriate as a function of the State Department of Health and Environmental Sciences and (3) of significant importance to the "health" of present and future generations.

The subject which I have been asked to discuss covers multisystem disorders and consequently it crosses many disciplines of the (1) basic sciences, (2) medicine, and (3) public health. It would be difficult to discuss the Immunological, Neurological, and Behavioral Disorders in Relation to Toxic Substances without integrating the talk with some of the subjects already discussed and those to follow.

Modern industry has introduced many mutagens and carcinogens into our environment in an attempt to meet the needs of our growing society. In addition, there are many natural mutagens and carcinogens in our environment. Researchers are discovering that the metabolites of many chemicals are also potentially mutagenic. We, by our life styles, seem to accentuate the exposure of our bodies to many and various toxic substances. It is clear by previous discussions today that environmental mutagens have many detrimental effects on humans, but perhaps the two most important are (1) mutation in germ cells resulting in the accumulation of heritable abnormal genes in the population, and (2) mutation of somatic cells resulting in the formation of malignant cells.

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During the past 10 years a great deal of progress has been made in the screening of environmental mutagens and carcinogens. These screening tests have included the use of bacteria, viruses, yeast, drosophila, cell cultures, and small laboratory animals using various indicators and assay methods. It has become clear that the expression of mutagenic potential under certain defined laboratory conditions is very reproducible and quantitative. The mutagenic potential can thus be calculated from the number of revertants measured in the linear region of the dose-response curve and can be expressed as the number of revertants per microgram per plate; or other quantitative units. There are, of course, many factors which influence the expression of mutagenic potential and these must always be taken into consideration when interpreting results and extrapolating the results to other more complex systems. In spite of many arguments to the contrary, it is generally accepted that most mutagens are carcinogens and that most carcinogens are mutagenic. One of the important questions is "how can the expression of mutagens in the various test systems be extrapolated to man?" There is no general agreement on the validity of these extrapolations.

A mutagen is defined as a substance that induces heritable changes in the genetic material. When the mutations are produced in the genetic material of somatic (body) cells, the mutation may ultimately affect the exposed person in diverse ways; for example cancer, accelerated aging, congenital birth defects, and other diseases. Such somatic cell mutations are not transmissible to future generations. When mutations are induced in the genetic material of germinal cells (egg or sperm), however, then the mutations can be transmitted to subsequent generations and contribute to the genetically determined disease burden.

It has become more and more clear that as the incidence and severity of bacterial, viral and other communicable diseases decline, that impairments in man resulting from gene and chromosomal changes are exerting an increasingly

serious impact on the health and economy of the human community. The fact that man-made chemicals are widely used and are mutagenic suggests that these chemicals constitute a genetic hazard for man, both for the current generation through production of gene mutations and chromosomal breaks in somatic cells, and for future generations through the production of transmissible gene mutations and changes in chromosomal structure and number.

Increasing numbers of potentially toxic substances (contaminants) are the by-product of an otherwise beneficial industrial process. Because the benefits of industry are needed in practically every segment of our economy, it is essential that toxicological information is obtained on all toxic substances in order to assess the need for control measures to protect occupational workers and the public from contaminant-induced health injury. The responsibility of governmental agencies to protect the public from environmental hazards is perhaps overwhelming and it is unfortuante that the level and sophistication of scientific knowledge and technology is not available to better assist regulatory agencies with the task of appropriate control while still maintaining (1) a quality of life which we have come to expect, (2) a sound economic structure and (3) adequate basic life sustaining services such as food, shelter and clothing.

Because of the diversity of those attending, I should like to give a brief definition of the triad of subjects which I have been asked to discuss:

(1) Immunological disorders would be defined as malfunctions of the normal immune system of the host, under the influence of toxic substances, which results in a depressed immune response, immunosuppression and/or complete failure of the host to respond to chronic or acute infections. The word infection is used in a broad sense and it would apply to the inability of the host to respond "normally" to developing cancer.

(2) Neurological disorders could be expressed as any clinical disease in which the central nervous system functions are impaired. Toxic diseases could alter neural functions over widespread areas and could, therefore, give rise to many diffuse signs and symptoms. Neurological and behavioral disorders which are not caused by toxic substances, may, in fact, be treated with various drugs/chemicals which in themselves might be mutagenic, carcinogenic, or have an adverse pathological influence on the host.

(3) Behavioral disorders would be defined broadly as changes which occur in a given subject, following the administration of a given chemical/drug, which deviate from the established "normal" patterns of development, movement, reactions, etc. Behavior as related to social action and reactions could also be considered under this broad heading as social action is influenced by the needs of society in relation to the uses of chemicals, drugs, etc.

I shall attempt to (1) give you a few examples of toxic substances which induce immunological, neurological and behavioral disorders, (2) integrate some of these with the other topics discussed and to be discussed and (3) make some recommendations relating to the potential responsibility of Montana.

Immunological Disorders

As indicated in the introductory definition, immunosuppression could include virtually all aspects of the immune response. We shall be concerned, however, primarily with artificially induced unresponsiveness and pathologically induced unresponsiveness. Artificially induced unresponsiveness can be demonstrated by the introduction of various toxic chemicals and by radiation. Both, applicable to the subject of toxic agents in our environment.

Many diseases can also alter immune unresponsiveness. This simply means that when a person is suffering from one infectious disease, that person is more susceptible to infection with other pathogenic bacteria, viruses, etc.

If a person has cancer, a proliferative disorder, it may induce both specific and nonspecific suppression of immunity. This form of immune suppression results from a specific interaction of the host's immune system and the disease. As a consequence, the normal immune function of the host cannot occur. The malfunctioning process may be induced actively or passively, that is, invading cancer cells may produce a substance which suppresses the host's immune reponse, or the person's normal mechanisms of resistance may be blocked.

The immunosuppressive properties of toxic agents have been studied in research with animals. Toxic substances are effective in inhibiting both humoral and cellular responses. Toxic agents do not inhibit all immune responses equally, however, since several factors combine to determine the potency of various toxic agents with respect to selected immune response.

In both animals and humans, the ability to inhibit manifestations of the immune response may result from activities other than immunosuppression. The immune response requires (1) immunologically competent cells and (2) nonspecific effectors such as neutrophils and monocytes. The number of neutrophils and monocytes is also altered by immunosuppressive chemicals and drugs.

Toxic chemicals have the capability of killing any cell which has the ability to multiply, including lymphocytes. Thus, producing significant immunosuppressive activity. Fortunately, few of these agents are used in treating patients. Toxic drugs have been categorized into 3 groups based on their ability to kill cells in different phases of the mitotic cycle: (1) phase-specific drugs which interfere with DNA synthesis, (2) cycle-specific drugs which kill both intermitotic and cycling cells and (3) cycle-nonspecific drugs which are equally toxic to both proliferating and intermitotic cells.

The majority of the competent lymphocytes are in the intermitotic phase of the proliferative cycle. Certain chemicals can, therefore, cause a generalized

depletion of immunologically competent cells.

Cytotoxic drugs/chemicals are detrimental to any rapidly dividing cell population, but the 3 tissues most severely affected are the bone marrow, the gastrointestinal epithelium, and the germinal cells of the gonads.

Bone marrow suppression is potentially the most serious toxic reaction and it is related to the dose of the drug/chemical substance.

The administration of cytotoxic drugs, and other alkylating agents, can interfere with gonadal functions, with the possibility of leading to sterility in both males and females.

What then, is the value of cytotoxic therapy as used in medicine? As an example, patients are given immunosuppressive drugs to prevent renal transplant rejection. It has been shown that the incidence of cancer in renal transplant patients is approximately 100 times that of the age-matched control population. These cancers appear mainly as lymphomas in many sites, including the central nervous system. This is an example of a Risk vs Benefit decision which must be made by the patient, family and physician.

Appropriate to the discussion of immunological responsiveness is the subject of aging. One of the characteristics of aging is the decline in the ability of the body to adapt to environmental stress. The increased chemical mutagenic load of the environment is a part of this environmental stress to the aging population. Indeed, is the aged population more susceptible to toxic agents? We know that there is an inverse relationship between immune activity and susceptibility to cancer.

There are a large number of immunodeficiency diseases which are inherited and we must ask "what influence do toxic substances in the environment have upon creating genetic deficiencies?" As indicated in my introductory comments, one of the major detrimental effects of mutagens is on the mutation of germ cells

resulting in the accumulation of heritable abnormal genes in the population. This obviously could lead to heritable disorders related to immune deficiency diseases. It has been noted that there is an unusually high frequency of chromosome aberrations in the lymphocytes of patients with many of these hereditary disorders.

Another example of the adverse effects of environmental toxic substances is in the case of the body's ability to respond normally to respiratory diseases. The immune system of the body protects, to a degree, the lungs from bacterial infection. There is a complex sequence of events which lead to efficient macrophage function in the alveolar regions of the lungs. Environmental toxic substances can interfere with phagocytic function in a number of ways. Individuals with underlying illnesses, especially chronic respiratory diseases, are particularly vulnerable to infection following exposure to airborne toxicants. These could include airborne gases and particulates such as ozone, nitrogen dioxide, sulfur dioxide, sulfates, silica and asbestos.

Since PCB (polychlorinatedbiphenyls) will be discussed specifically tomorrow, I should mention here that no chromosomal aberrations have been observed in human lymphocyte cultures exposed to PCBs at 100 ppm and there is no evidence of mutagenic effects of PCBs using the dominant-lethal assays. PCBs do not produce chromosomal abnormalities in rat bone marrow or sperm. The PCBs may, however, cause a decrease in the number of sperm cells.

The effect of PCBs on the humoral and cell-mediated immune response has shown that immunity is depressed and that the lymphoid system is generally depleted. Liver damage is a common observation in animals which do not survive the experiments. Most of these studies have been conducted on guinea pigs.

The immunosuppressive activity of PCBs has been demonstrated by observations of reduced white blood cells, atrophy of the cortex of the thymus, and a reduction in spleen and lymph nodes following application of high doses of the PCBs.

Neurological Disorders

The nervous system is composed of neurons, supporting cells of the neuroectodermal origin, and supporting cells of mesodermal origin. Neurons are the functional units of the nervous system and are capable of generating and conducting the electrical activity that underlies nervous system performance. Mature neurons do not undergo proliferation, therefore, most disease processes that affect neurons produce only neuronal degeneration and loss. This is as opposed to the proliferative nature of the immune system cells as discussed previously.

Various chemical agents, both endogenous and exogenous, may alter neuronal functions. When this occurs, the manifestations are almost always diffusely distributed throughout the nervous system. Depending on the nature of the specific toxin, or metabolic abnormality, the effect may be exerted on the nervous system acutely, subacutely, or chronically. Pathological changes vary with the chemical agent, but may include reactions such as ischemia, edema, demyelination and cell death.

An example of an environmental pollutant which causes neurological disorders is carbon monoxide poisoning. Carbon monoxide causes (1) the visual light threshold to be increased, (2) headache, (3) nausea, (4) abnormal manual dexterity, (5) coma and (6) convulsions.

Many of the antipsychotic drugs produce neurological symptoms. These drugs act primarily to depress the subcortical area of the brain. As an example of the complexity attending the utilization of antipsychotic drugs, phenothiazine has over 100 active metabolites. There is evidence that another antipsychotic, chlorpromazine, significantly elevates the incidence of chromosome derangements in patients treated with the drug. There is reasonable evidence that the phenothiazines may be mutagenic. Some of the tranquillizers of the phenothiazine group are known to induce toxic side-effects, especially extrapyramidal

disturbances that may be irreversible. In a survey of 3775 patients receiving phenothiazines, one researcher found that 15% developed Parkinsonism (a degenerative disease characterized by muscle rigidity due to a brain disorder). There are many more examples of toxic side-effects of the psychiatric and neurological drugs.

There is some research which indicates that the PCBs produce neurological symptoms. The administration of high doses of the PCB (Archlor 1242) produces diarrhea, loss of weight, unusual stance and gait, lack of response to pain stimuli and central nervous system depression. This suggests that the PCBs may be important in altering many of the biological responses of mammals which are subjected to environmental chemical stress.

The human effects of the PCBs may perhaps best be illustrated by the 1968 outbreak of poisoning in Japan involving over 1000 people (some estimate that 15,000 may have ingested the chemical). Rice bran oil was contaminated with PCB as an industrial accident. The clinical aspects of the outbreak included: chloracne, blindness, jaundice, edema, and abdominal pain. Newborn infants of poisoned mothers had skin discoloration due to the presence of PCB via placental passage. This skin discoloration lasted from 2 to 5 months. Obviously, the amount of PCB ingested in this accident was far greater than the "normal" exposure through foods.

PCBs do, therefore, exert some negative influence on animal systems including immunological disorders, neurological disorders and perhaps behavioral disorders.

The central and peripheral nervous systems are particularly vulnerable to the toxic effects of metals in general. The toxic action is often more severe, however, at sites of entry and elimination of the metals. Arsenic, lead, mercury, manganese, thalium, phosphorus and related compounds are the most important toxic substances in terms of neuropathology.

Arsenic, widely used in industry, has been a constituent of many weed and insect killers and was formerly used in paints. In acute intoxications, abdominal discomfort, vomiting, diarrhea, and terminal circulatory collapse are common symptoms. Involvement of the brain is indicated by headache, confusion or coma, epileptic convulsions and evidence of raised intracranial pressure. The amount of arsenic which accumulates in the brain is unusually high. Arsenic and its compounds are also stored in the mesenchymal cells, in the Kupffer cells of the liver and in endothelial cells of the sinuses of the spleen and the capillary endothelium and microglial cells of the central nervous system.

Lead is an example of a once common industrial contaminant which has largely been eliminated by appropriate legislation. Lead is currently a problem mainly through accidental ingestion or inhalation. For example, tetraethyl lead, or lead benzine inhalation can cause fatal poisoning. The effect is mainly on the central nervous system with symptoms of delirium convulsive seizures, and coma.

Manganese, another industrial compound can lead to poisoning exhibited by a neurological disorder. These symptoms are severe tremor, memory loss and intellectual defects.

Mercury, as an industrial disease, results in a neurological syndrome characterized by tremor, an organic personality change, including fatigue, irritability and emotional instability. Some of the mercury compounds have been used as fungicides (the phenylmercuries).

Behavioral Disorders

There may be some questions as to how the subject of behavioral disorders fits into the theme of this seminar. In fact, behavioral toxicology has been an extremely active area of research during the 1970s and there is a close relationship between behavioral and neurological functions.

A great deal of research has been carried out in animals and human subjects in order to assess the adverse behavioral effects of alcohol, tobacco smoke, and several drugs of abuse and to compare the behavioral changes observed with those which are seen following treatment with ionizing and nonionizing radiation, hopoxia, carbon monoxide, compounds used in manufacturing industries, pesticides, air and water pollutants, food additives, etc.

Areas of concern include the use of drugs/chemicals for various types of psychotherapy, as indicated in the discussion on neurological disorders, and drugs of common abuse such as tranquillizers.

For our purposes today, I shall comment on the behavioral aspects of certain psychotropic drugs, pesticides, food additives, mercury and lead as illustrations of disorders.

Exposure of immature organisms to various chemicals can lead to behavioral changes that are not usually obtained by treating adult animals. Studies have demonstrated deviations from normal behavior after pre or postnatal administration of psychotropic agents. Pre or early postnatal treatments with psychotropic agents can influence behavioral development in widely differing ways, ranging from direct effects on brain mechanisms at the time of exposure, to altered mother-offspring interactions at a time when the drug is no longer present. The latter may be an indication of the irreversible nature of the damage.

The literature on the behavioral effects of pesticides shows that the organophosphate and carbomate compounds have been used extensively both in toxiological investigations, and in studies of biochemical/behavioral correlations. The concern created by the persistence in the environment of agents such as DDT has led to a number of studies of the behavioral effects of organochlorine insecticides. There is evidence reporting changes in a number of behavioral

criteria such as (1) activity, (2) avoidance, (3) discrimination, (4) operant and maze behavior, (5) maternal and agressive behavior and (6) electrical activity.

A survey of the studies concerned with the pre and early postnatal treatment with pesticides shows, however, few clues to the understanding of the mechanisms by which these chemicals affect behavioral development. A number of observations in mice using prenatal DDT, chlordane, and parathion have shown different behavioral patterns for the different chemicals, but it seems clear that there are changes associated with (1) maturation of seizure sensitivity, (2) enhancement of open-field activity, (3) retarded avoidance, and (4) T-maze performance.

Alterations in the reproductive functions in rats and mice after exposure (prenatal or neonatal) to DDT (or its analogs) have also been observed. This is also true for the PCBs.

Altered development of "rearing" in rats after prenatal administration of the herbicide 2,4,5 T (trichlorophenoxyacetic acid) confirms that the weak estrogenic activity of several of the organochlorine compounds might play a role in behavior modification, that is, produce a form of behavioral disorder.

We are all aware that a wide range of possible toxic substances enter the body through foods and beverages. Studies using nitrites, butylated hydroxytoluene, cyclamates and monosodium glutamate are examples to point out concerns about developmental changes induced by these agents. Using monosodium glutamate in newborn mice, an obesity-hyperactivity syndrome can be observed. This resulted in an irreversible inhibition of pituitary prolactin and growth hormone secretion. It appears that monosodium glutamate possibly interferes with "organization" of the central nervous system by hormonal influences during critical periods of development. When these same studies with monosodium glutamate are conducted in mature animals, only transient behavioral disorders are observed.

In studies utilizing mercury compounds, the same types of data result. That is, the introduction of mercury compounds into immature animals and birds results in a high sensitivity as compared to the same administration in mature birds and animals. Some of the behavioral disorders observed are: changes in developmental sequence, neuromotor coordination, and a general debilitation including neurological functions.

The same general statements apply to the use of lead and lead compounds in animal research. The immature are more sensitive and higher doses of lead cause gross neurological disorders. The lower doses cause more subtle behavioral changes.

Most of the above experimental observations in animals followed indications of adverse effects in humans. Unfortunately, satisfactory criteria for extrapolation from animals to man are not available. One could speculate that allowable levels of exposure to most of the agents mentioned here would have to be brought down to near zero level in the case of expectant or nursing mothers and very young children. This is the so-called high risk population.

The fact that behavior affects both disease and the maintenance of health has been known for a long time, but procedures have not been generally available to change behavior in a positive and clinically useful way.

It seems well established that behavioral phenomena are strongly influenced by both genetic and environmental factors. In man, behavior itself is not under rigid genetic control. Organisms always act within the context of environmental surroundings and from the time of birth environmental forces play a major role in influencing behavior, both present and future. With this limited background, I would like to discuss very briefly another aspect of behavior which may have relevance to the subject of this seminar. This is in the broad category of

social behavior as it relates to decisions which we as individuals and a society must make regarding "life styles". We must ask ourselves the questions "what do health and illness mean for us and what is the significance of health and illness for society as a whole?" Clearly, the meanings of health and illness emerge partly through individual experience and partly from views current in our society which reflect the values of society. Patients who are ill adjust to the illness, particularly if it is chronic, and the patient adjusts to the demands of society with regard to the illness (what health care is available, what are the conditions for hospitalization, what are the probabilities for long-term care, etc.). The question is "will the use of toxic chemicals, mutagens, and carcinogens become a part of the accepted behavior of our society?" Is the use of toxic substances and the distribution of environmental pollutants a reality for (1) a growing population, (2) an industrialized society, (3) our attempts to feed the world population, etc.? What is the risk/benefit ratio? What is the reality of our existence?

The "way of life" which we have chosen is a contributory factor facilitating contacts with toxic substances. While we do not like it, we seem to accept the fact that automobile fatalities, air disasters, etc. are a part of contemporary society. Do we also need to accept the probability that there will be increasing exposure of man to toxic substances as a part of modern society?

This notion of a harmful way of life, thus involves a social behavioral disorder. The genetic diseases caused by toxic substances constitute for our society a significant picture of illness to future generations. Our way of life in our environment of toxic substances may, thus, be viewed as pathological.

The fact that this seminary is being held and the diverse group of individuals in attendance would lead us to believe that we are not on a one-way street with regard to future generations. Fortunately, we view life as health, we believe in the triumph over disease by cure or prevention, we strive to reduce infant

mortality and we continually strive for an increased life expectancy.

Summary

The general comments which you have heard here may not serve to clarify the complex relationships between genetic, immunologic, neurologic and behavior disorders caused by toxic substances in our environment and at use in our society, but the indicators of the hazards to the human population should be apparent. Governmental agencies and society must deal with the complex social and economic questions of risk/benefit analysis.

During the last 10 to 15 years, advances in medical genetics have suggested a doubling in estimates of the human genetic load representing serious genetic disorders suffered by our population.

The present estimate of these genetic disorders indicates that about 10% of all liveborn infants will manifest a wide variety of serious genetic diseases.

The bulk of this currently recognized disease burden, some 9%, comes from the category of congenital malformations and multigenetic conditions that have not been amenable to simple Mendelian analysis. Recent national and international reports assessing the impact of mutation in increasing these diseases are at variance. Some suggest that the mutational component may range from 5% to 50%.

It has also been shown that genetic, primarily chromosomal, disorders are responsible for about 50% of all spontaneous abortions.

It has been estimated that if only 50% of our health costs are attributable to genetically related diseases, that we have a substantial social burden involved in the treatment and maintenance of afflicted persons. In all likelihood, environmental mutagens contribute to a large and costly increase in the genetic health burden.

The task of screening environmental agents for mutagenicity seems overwhelming. Thousands of compounds exist which have not been adequately tested.

The selection of compounds to be tested needs to be based on a priority system such as (1) exposure of large segments of our population (especially those of child-bearing age and very young children), (2) length of exposure, (3) persistence of exposure, and (4) structure-activity relationships of the compounds. The screening of environmental agents offers the possibility of eliminating the most deleterious environmental agents. In addition to limiting exposure to genetically active environmental agents, it is equally, or more important, to evaluate all new compounds for mutagenic activity prior to their introduction into the environment.

Wide-spread, expensive and time-consuming programs of monitoring human populations, especially those in high risk categories, need to be expanded. Increasing the amount and quality of the human data can only strengthen the health-protecting intent of regulations controlling chemicals that are deemed crucial to the production of food and energy.

There may be a strong link between the stiffness of regulations designed to shield the public from present and potential health risks and continuous research efforts to support and expand the data base for regulations. Prolonged research programs, do not necessarily mean or imply more and more regulations.

Recommendations

1. Montana should establish a testing and screening center for potential mutagens and carcinogens.
2. Montana should establish a human genetics testing and screening program for measurement of germ cell damage in the population.
3. Montana should develop an epidemiological research program for gathering statistical data on normal and high-risk populations (industrial workers/ women of childbearing age/newborn children).

4. Montana should increase the amount of genetic counselling available to premarital couples and couples in the childbearing age.
5. Montana should have ongoing informational programs relating to the hazards and potential hazards of toxic substances to the public health.

It is proposed that these recommendations should be implemented through a central office/center which would incorporate research, testing, screening, and direct public informational services on mutagens, carcinogens as related to toxic environmental substances.

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EPIDEMIOLOGY OF TOXIC SUBSTANCES
PBB AND CUMMINGTONITE - GRUNERITE CONTAMINATION

In the summer of 1973, Michigan farmer Rick Halbert noted that his cows had become ill. About 400 of his 750 cows had developed a toxic syndrome characterized by anorexia and decreased milk production (in September his 13,000 lbs. of milk per day dropped to 7,600 lbs. and his feed consumption dropped by a half within a 20 day period). After a month several cows became lame, and many had excess lacrimation and urinary frequency.[1] He tried plain hay rather than the animal feed and appetite and milk production improved, but did not return to normal. Several weeks later he noted hematomas on the animals that developed into abscesses; he also observed weight loss, wrinkled and thickened skin, abnormal hoofs and hair growth; and several cows that had been bred went back into estrus.[2] All rodents began to disappear from the farm premises.

The local veterinarian was stupefied; antibiotics had no effect. Tests on the cows revealed no evidence of pesticides or heavy metals.

He then experimented by feeding 12 heifers animal feed; within six weeks, five of the 12 had died. An autopsy revealed liver abscesses, atrophied testes with abnormal sperm, and abnormal spleens.

Animal feed sent to the Michigan Department of Agriculture was tested on rodents killing all in three separate experiments within five to 14 days. Unfortunately, they had no interest in pursuing this lead further, and advised farmer Halbert to review his own farm procedures.

Undaunted, partly because of continuing financial loss, and partly because of his chemical engineering background and budding interest in investigative epidemiology, Halbert contacted the USDA National Animal Disease Center in Ames,

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Iowa. They checked the animal feed for mycotoxins finding none. However, during a lunch break a technician left a gas chromatograph on - a late-appearing peak then appeared on a test of animal fat fed the animal feed. The Animal and Plant Health Inspection Service canceled the investigation for lack of funds. Halbert then asked the Wisconsin Alumni Research Foundation to test his animal feed further notifying them of the late peak. They identified it to contain a halogenated compound - and Halbert knew he was at last onto something.

He then contacted the National Pesticide Degradation Laboratory at the USDA Research Center near Washington, D.C. There, Dr. George Fries matched the mass spectrogram with that of polybrominated biphenyl (PBB). By sheer serendipity, Dr. Fries had seen an advertisement for PBB in a chemical journal and had obtained a free sample. He had made a mass spectrogram which was compared to that obtained from the animal feed - eight months after Rick Halbert's cows had started to become sick.

The animal feed was incriminated, and consequently the supplier, Michigan Farm Bureau. Further investigation revealed that Michigan Chemical Company manufactured PBB (Firemaster BP-6) and the feed supplement magnesium oxide (Nutrimaster).[1] During the previous summer, they had exhausted their supply of red PBB bags; instead, they packaged the PBB in the same brown bags used for magnesium oxide and attached a red label. Michigan Chemical Company manufactured 12 million pounds of PBB 1970 to 1974 used as a fire retardant in plastic housings for office equipment, televisions, etc. About ten to 20 fifty lb. bags of PBB were mistakenly shipped to Michigan Farm Bureau, and added to animal feed. A bag still containing PBB was found at Michigan Farm Bureau.

In May, 1974, more than 500 Michigan dairy herds and poultry farms were quarantined. Over 35,000 cattle and 1.5 million chickens died or were destroyed.

During this period, meat and dairy products containing PBBs (beef, poultry, pork, eggs, milk, cheese) were widely consumed in Michigan.[3] A cycle of secondary and tertiary contamination with PBB was initiated by feeding livestock protein supplements that incorporated remnants of carcasses from PBB-contaminated animals. Polybrominated biphenyls were subsequently found in serum and adipose tissues of dairy farmers in the state as well as many urban Michigan residents.[4]

Firemaster PB-6 is a mixture of polybrominated biphenyls predominately hexabromobiphenyl (63 percent)[5] (Figure 1). Several other polybrominated compounds

FIGURE 1

POLYBROMINATED BIPHENYLS

TETRABROMOBIPHENYL	2.0%
PENTABROMOBIPHENYL	10.6%
HEXABROMOBIPHENYL	62.8%
HEPTABROMOBIPHENYL	13.6%
OTHER BROMOBIPHENYLS	11.0%

are found in the commercial mixture as well as traces of brominated benzenes and bromonaphthalene. PBB is lipotropic, induces the hepatic mixed function oxidase system, crosses the placenta, is excreted in maternal milk, and has been estimated by the Food and Drug Administration to be five times as toxic as the polychlorinated biphenyls (PCBs).[6,7] It has been demonstrated to be a weak teratogen in rodents.[8]

To complement the "shoe-leather epidemiology" of Rick Halbert, several studies were then initiated to determine if the PBB contamination was a human health concern. PBB was a virtual unknown regarding acute organ toxicity and chronic effects - i.e. carcinogenesis, teratogenesis, mutagenesis, immunological impairment, etc.

The first epidemiologic study undertaken was in 1974 by the Michigan Department of Public Health.[7] They evaluated 165 persons from quarantined farms and 133 controls from non-quarantined farms. The medical survey included a symptoms questionnaire, physical examination, urinalysis, and complete blood count. There were five of 24 symptoms that more than ten people complained about in the quarantined group: balance problems, skin rashes, headache, fatigue, and anxiety. There were no acute or short-term illnesses that they could attribute to PBB. However, the study had several major faults: a) over 70 percent of the controls were found to have PBB in their blood so were not an unexposed group, and b) there was only a limited evaluation with no effort to assess possible chronic effects.

The second epidemiologic study was conducted by the Environmental Sciences Laboratory, Mt. Sinai School of Medicine, New York, during Autumn 1976.[7] The speaker of the Michigan State House and the Director of the State Health Department invited Dr. Irving Selikoff to do a survey with two objectives: a) to determine possible adverse human health effects, and b) to establish clinical and laboratory information on a population cohort. The selection of the cohort was again critical: 1) 613 exams were drawn from random invitations (but these were not randomly accepted).

a) 305 exams were from quarantined farms

b) 97 were from consumers who purchased produce from participating quarantined farmers

c) 141 exams from consumers who purchased produce from participating non-quarantined farms.

2) 373 exams were done at request (biases thus unknown) and 55 exams were of Michigan Chemical Company employees.

A control group of 254 Wisconsin dairy farmers randomly selected from an established list of area diary farmers were studied in the same way at the Marshfield clinic in central Wisconsin.

The response rate of those farms invited were as low as 17 percent among Wisconsin controls, to 48 percent among Michigan random invitations to 86 percent of Michigan non-random invitations.

Four factors clouded the study from the outset -

a) extensive publicity of the study may have created selection biases among those more likely to participate, and influence their subjective symptoms; b) the PBB contamination episode occurred three years earlier - in 1974 68 percent of 1770 feed samples contained PBB, in 1975 six percent of 1208 feed samples contained PBB, and in 1976, 0.3 percent of 663 had PBB; c) study participants had frequently suffered tremendous financial and personal losses creating high levels of stress and anxiety not to mention the fact that the human health effects of PBB were largely unknown; and d) neither study participants nor investigators were blinded in administering questionnaires.

The Michigan group was younger (mean age 28.3 vs. 32.8 years) but the sex ratios were the same.[7] There was an increased prevalence of skin, neurological and musculoskeletal system complaints among the Michigan group, and an increase in hepatic enzymes (sGOT and sGPT). There was no significant difference among people from quarantined and nonquarantined farms with the exception of fewer neurological symptoms among consumers of products from nonquarantined farms. Also, there was no correlation between levels of PBB or alcohol consumption and

hepatic abnormalities. Bahn et. al. subsequently reported primary hypothroidism in four of 35 (11.4 percent) workers exposed to decabromobiphenyl - some of the neurologic symptoms e.g. hypersomnolence in some farmers may actually have been due to hypothyroidism.[9] There was a clustering of serum PBB levels among Michigan family units, and none detected in the Wisconsin group. Levels were significantly higher among farmers from quarantined farms and their consumers. PBB levels were higher in adipose tissue due to storage.

Immunological studies were carried out on a small sample of five subjects because of the complaints of increased infections in the farmers, the evidence of mastitis and abscesses in cattle, and published reports of PCBs depressing immunologic function.[10,11,12] Since all five subjects had results significantly deviant from normal, a larger field survey of 45 adult Michigan dairy farmers and members of their families was undertaken.[13] They had eaten PBB-contaminated food for three months to four years after the original accidental contamination of cattle feed and many considered their overall health status to have significantly changed in the previous three to four years. For comparison, a similar group of 46 dairy farmers and members of their families in central Wisconsin who had not eaten PBB-contaminated food was examined, as were 70 healthy subjects in the New York area.

Among the PBB-exposed Michigan residents, two populations were recognized.[14] In 27 of 45 PBB-exposed Michigan residents, the peripheral blood lymphocytes responded within a normal range to PHA and PWM, and showed reduced reactivity in mixed leukocyte culture. In the remaining 18 of the 45 PBB-exposed subjects, the peripheral blood lymphocytes showed a significantly reduced response to PHA and PWM, and reduced reactivity in mixed leukocyte cultures. (Table 1)

Values obtained for the Wisconsin dairy farm residents and healthy subjects in New York were similar in each of the lymphocyte surface marker characteristics

TABLE 1

GROUPS		PHA Stimulation Index	PWM Stimulation Index	MLC Stimulation Index
NORMALS (New York)	N=79	257	194	
WISCONSIN DAIRY FARMERS	N=46	292	190	66
MICHIGAN PBB EXPOSED FARMERS Normal Lymphoblastogenesis	N=27	281	186	49*
MICHIGAN PBB EXPOSED FARMERS Abnormal Lymphoblastogenesis	N=18	71*	77*	20*

*p<.00001 Student's T-test

(Table 2).[14] On the other hand, for the 27 Michigan farm residents within the normal range of mitogenic response, the percentage of T cells was decreased, and there was an increase in null cells. Eighteen of the PBB-exposed Michigan residents showed significantly reduced T and B cell lymphocytes with an increase in null cells.

Figure 2 shows the serum PBB levels for the Michigan and Wisconsin farm

FIGURE 2

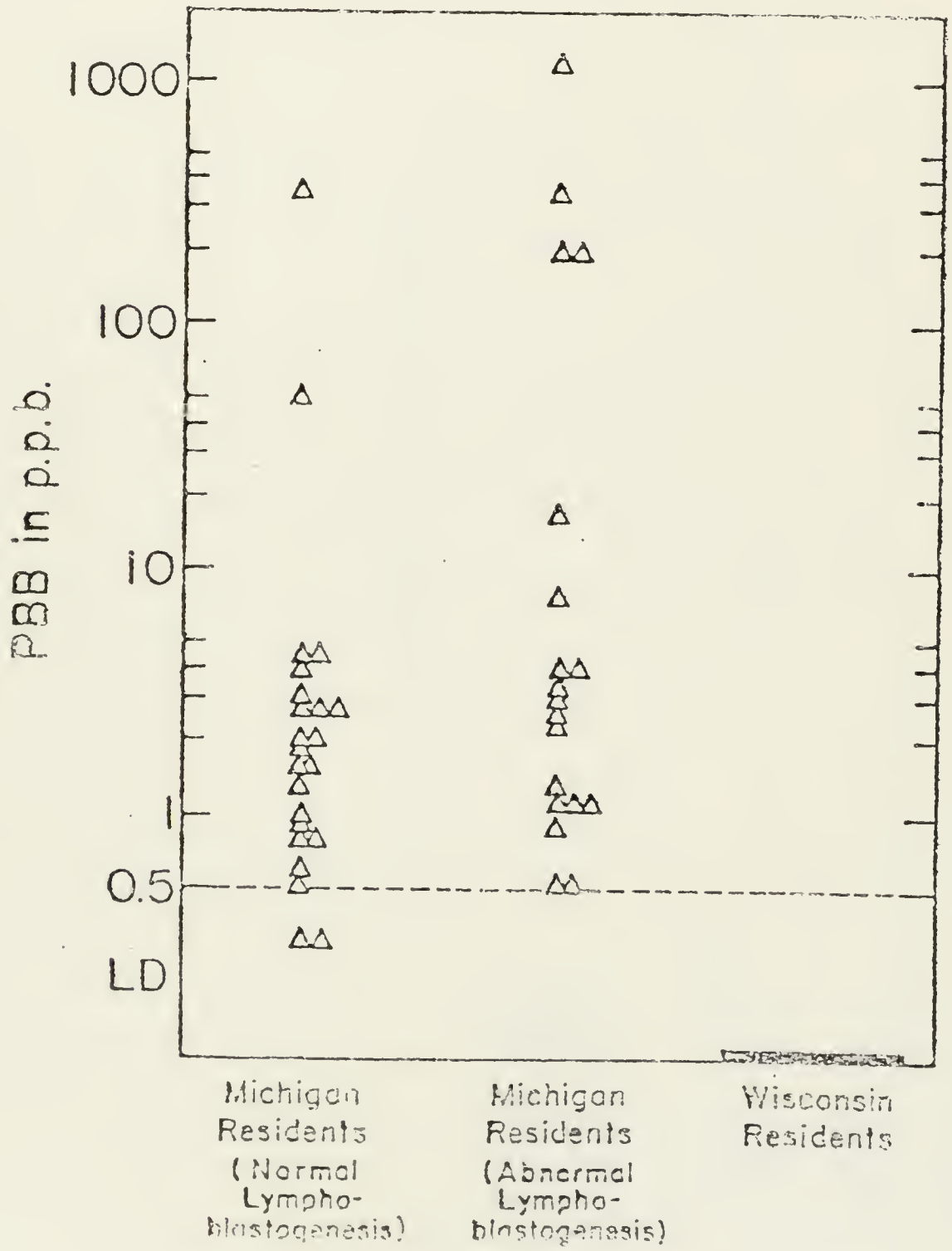

TABLE 2

LYMPHOCYTE MEMBRANE MARKERS IN PBB-EXPOSED MICHIGAN FARMERS

GROUPS		T-CELLS	B-CELLS	NULL CELLS
NORMALS (New York)	N=79	74% (1,986)	22% (521)	4% (82)
WISCONSIN DAIRY FARMERS	N=46	71% (1,473)	23% (487)	6% (143)
MICHIGAN PBB EXPOSED FARMERS	N=27	60% (1,341)[3]	21% (467)	19% (406)[2]
Normal Lymphoblastogenesis				
MICHIGAN PBB EXPOSED FARMERS	N=18	44% (917)[2]	16% (331)[3]	40% (850)[1]
Abnormal Lymphoblastogenesis				

1 $p<.00001$
2 $p<.001$
3 $p<.01$

residents.[14] All but two PBB-exposed Michigan dairy farm residents had trace or greater ($\geq$0.5 parts per billion) quantities of PBB detectable in their serums.[14] Although those with higher PBB concentrations had a somewhat greater tendency to have abnormal lymphocytes, there was no consistent correlation between PBB plasma concentrations and lymphocyte function in either of the two groups of PBB-exposed Michigan dairy farm residents. However, a relationship between PBB in adipose tissue and immune reponse may exist.

Immunologic abnormalities were detected in another study, and were found in one of two animal studies performed.[15,16,17] Thus, it appears that PBB may alter lymphocyte function. Which PBB compound or isomer has this effect is unknown. Some members of the exposed population appeared to be more susceptible. The significance of immune impairment re: infections or malignancy and the persistence of the abnormalities can only be determined by a prospective study.

The third major epidemiologic study was designed to study chronic effects in a prospective manner.[10] It is being performed by the Michigan Department of Public Health sponsored/funded jointly by NIH, CDC, EPA, and FDA. During 1976-7 3639 people from PBB-quarantined farms, people who ate food from quarantined farms, and workers from Michigan Chemical Co. (and their families) were registered. During 1978, 2,000 Iowa dairy farm residents with no known exposure to PBB were enrolled for comparison purposes. Emphases will be placed on birth defects in their offspring, cancer incidence, and chronic diseases. Analysis of symptom prevalence data showed that symptoms had occurred most frequently in volunteers and in persons from non-quarantined farms with low level PBB contamination; symptoms were least prevalent in quarantined farm families and in chemical workers. PBB levels were obtained and there was no agreement between the PBB level and symptoms; symptom prevalence rates were slightly higher in persons with no

detectable PBB in serum than in those with measurable quantities. Mean PBB levels ranged from 43 ppb in Michigan Chemical Co. workers to 27 pbb in quarantined farmers to 17 ppb in consumers of quarantined farm produce to 3.5 ppb in non-quarantined farmers to 3.2 ppb in urban volunteers. This study did not confirm the findings of the first Selikoff study illustrating that selection factors may have played an important role in the observed distribution of complaints. In contrast to the first two cross-sectional or prevalence studies (of people exposed rather than with a disease), this was both a cross-sectional and a prospective cohort study.

The fourth major epidemiologic study (referred to a Selikoff II) is a repeat of the first Mt. Sinai study but done in response to criticism of sample selection.[18] It involved a random sample of 1750 Michigan residents in six cities who again underwent histories and physical examinations, blood tests, etc. during the period May-August 1978. Initial results detected PBB in most subjects at low levels (despite being five years post-contamination episode), but unlike farmers examined in previous studies, they did not have an unusual number of symptoms of illness.

Legal claims in the disaster have been multitudinous--claims by farmers against Michigan Farm Bureau, suits by non-quarantined farmers with ill livestock against Michigan Farm Bureau, claims against Michigan Chemical Co. (and their new owner Velsicol) by Michigan Farm Bureau, indictments for lying about a cover-up, class action suits by OCAW union for failure to warn the Michigan Chemical Co. workers about the dangers of working with PBB, etc.

The PBB contamination episode was fortuitously limited to one area. Unfortunately, almost a year passed before the pollutant was identified. Once identified, the toxicity of the polybrominated biphenyls was practically unknown.

Lessons learned from the episode include: rigorous premarket toxicity testing of chemicals is essential; strict safeguards for handling and distributing hazardous chemicals should be mandatory; federal or other regional technical assistance should be readily available in the event of chemical contamination incidents; and emergency relief loans are needed in chemical disasters for affected individuals. The Toxic Substances Control Act will ameliorate several of these problems by premarket testing of new chemicals under the regulation of the EPA. Regional academic resource centers funded by NIOSH, NIEHS, and EPA can assist in investigation of contamination episodes because of manpower expertise and laboratory capabilities. Study design to determine human exposure and effects is of crucial importance; identification and funding of regional academic centers or other state or federal agencies to provide contamination investigation skills is necessary.

The second contamination episode concerns asbestiform-mineral pollution of Lake Superior. Asbestos has been identified as a carcinogen for lung, mesothelial linings, gastrointestinal tract, larynx, buccal cavity, kidney, and possibly other organs.[19] Insulation workers exposed via inhalation are at greatest risk, but swallowing asbestos-laden mucous is thought to be responsible for gastrointestinal cancer.

Reserve Mining Company (a mining subsidiary of Armco and Republic Steel, America's fourth and fifth largest) began to mine low-grade iron ore at Babbitt, Minn. in 1955 with a processing plant located 50 miles away in Silver Bay, Minn. Both communities were hewed from the wilderness in classic company-town tradition. Reserve employs 3,200 workers to produce 30,000 tons of taconite per day (15 percent of America's iron output) resulting in $40 million of annual payroll and profits of $18 million annually.[20] Low-grade ore is surface-mined in Babbitt,

crushed, transported by rail to Silver Bay, crushed to a fine powder, separated (using large magnets to separate the iron to increase the percentage of iron from 23.5 to 67 percent), pelletized, and shipped via the Great Lakes. The seldom mentioned by-product of the process is 67,000 tons of tailings produced daily and dumped into Lake Superior. The taconite process was greated with acclaim in an economically-deprived region; no one thought the tailings a pollution problem since they were "inert". .Yet 10 to 15 years later a vast blue-green smudge was noted from Silver Bay toward Duluth in the once pristine Lake Superior. The inert tailings were finding their way into an unspoiled ecosystem. In 1971, EPA ordered Reserve to develop an on-land disposal scheme within six months; Reserve failed to do so and was sued in 1972 by EPA, three states, and five environmental organizations. The trial was a landmark environmental case whereby the tailings were proved to be harmful to marine life and widely dispersed in the lake. But in 1973, the case took a new twist since half of Reserve's ore contained cummingtonite-grunerite, an amphibole or asbestiform rock. These small silicate fibers were found at the level of 35 million fibers/liter in Duluth's drinking water, and in the ambient air of Silver Bay at five times the level found in the vicinity of asbestos spray-insulation in skyscrapers.[20] The specter of a health hazard emerged prompting the federal district court Judge Miles Lord to close the entire operation in April 1974. Yet within two days, the corporation was granted a stay of the order by the 8th Circuit Court of Appeals and instructed to promptly develop an on-land disposal plan.

Asbestos when inhaled had been associated with a myriad of illnesses, but there is a paucity of information on the ingestion of asbestos. Harrington et.al. investigated the use of asbestos-cement pipe for public water supply and the incidence of gastrointestinal cancer for the years 1935-73 in Connecticut

using the Connecticut Tumor Registry.[21] No association was found. Wigle studied cancer mortality in relation to asbestos in municipal water supplies in 22 communities in Quebec finding an excess of stomach cancer (males), pancreas (females), and lung (males) in the two municipalities with known high exposures.[22] These excesses were considered caused by occupational exposures; however, Kanarek, as reported in his doctoral thesis, found an association between the use of asbestos-cement pipe for drinking water and the incidence of cancer of the peritoneum, lung, gallbladder, pancreas, stomach, pleura, and kidney while controlling for occupational exposures.[23] Sadler et. al. studies the use of asbestos-cement pipe in Utah comparing cancer-incidence for 11 sites 1967-1976 in 14 communities with predominantly asbestos-cement piping for 20 years or more to 27 communities that had never used asbestos-cement piping.[24] No associations were found for gastrointestinal cancer but an increased standard incidence ratio (SIR-192) was found for cancer of the kidney in men. However, the latent period in the study was short resulting in a low total person-years of exposure beyond 20 years.

Gastrointestinal cancer has been found to be increased in five cohort studies of asbestos workers from at least four countries.[25-29] Asbestos has been determined to penetrate the gastrointestinal mucosa, and has been found to be widely dispersed in the body among those with asbestosis or pleural thickening.[30,31] Duluth residents following drinking Lake Superior water have even been noted to excrete amphibole fibers in their urine.[32]

Mortality studies of Duluth residents by Masson et. al. found an excess of cancer of the rectum 1950-1969 in both sexes but no consistent trend at other sites.[33] Levy et. al. found no excess in total GI cancer incidence among Duluth residents 1969-72.[34]

Duluth subsequently installed a filtering system for drinking water to remove the asbestiform fibers during 1977. However, in early 1976, Judge Miles Lord was removed by the appellate court from the case because of an outward show of exasperation at Reserve's foot-dragging in proceeding to an on-land disposal system. The Company attempted to utilize a pristine area considered a top priority for a state park near the plant for tailings disposal, but later chose a site seven miles from the mill on their railroad spur. In addition, Reserve continually threatened closure if forced to go to on-land disposal despite economic analyses to the contrary, and portrayed themselves as unfairly victimized by an over-regulatory federal government. Judge Lord wrote, "Defendants are using the workforce at Reserve's plants as hostages. In order to free the work force of Reserve, the court must permit the continued exposure of known human carcinogens to the citizens of Duluth and other North Shore communities. The court will have no part of this form of economic blackmail."[20]

The "New York Times" commented in a January 10, 1976, editorial, "Judge Lord's indignation at Reserve's outrageous tactics has served at least to pierce the crust of public apathy and to make the public health menace real and understandable...Meanwhile those 67,000 tons containing those deadly fibers are still being poured into the lake each day, every day."[35]

By April 15, 1980, Reserve will have completed its on-land disposal system at Milepost 7, 11 years since their first encounter with a request to cease and desist their pollution of Lake Superior. Yet five other taconite companies have on-land disposal systems, and maintain positions of high profitability.

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SPEAKER PANEL

Thank you very much, John. I really didn't appreciate the kind of foresight that Bartlett and Dr. Knight and the Department of Health had in scheduling this thing until I picked up the Montana Standard today, and you talk about loading the media coincidental with their seminar on toxic substances and public health. Believe it or not, there are three articles in this morning's Butte paper -- one of them on a lethal biological agent reportedly contaminating many in a Soviet city, one on Agent Orange, and one on a group formed to defend a spray being blamed for miscarriages. So that's a good job, John. That's the way to get the folks packed in.

My role this afternoon is right in line with my capabilities. It's very simple. I'm simply to moderate the questions that you have, of what I understand has been a very excellent program today. Someone said something about a horror story this morning. I'm sorry to have missed that; most of those are on television anymore. But as John indicated, one of the things that has frustrated all of us who work in government is the late-night worrying about whether man's inventiveness has, in fact, brought us down the road that more and more threatens our own disaster, and that's from the layman's point of view, because many of the words that I see in your program I can't even pronounce. But if you spend Christmas weekends with Doc Glosser worrying about a vat full of toxaphene, or if you survive, as Gordon McOmber and a number of other people did last summer, worrying about not only the economic but some of the public health impacts of PCB, it's clear that the ingenuity that we seem to be able to bring to the suppression and cure of diseases and treatment of weeds and all the other things that we don't like in society, are really coming back to haunt us. And I couldn't help thinking -- and I was wondering this morning how this panel was going to go this afternoon -- about something Jonas Salk said some years ago. He said that life is an error-making

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Moderator: Honorable Ted Schwinden, Lt. Governor, State of Montana, Helena, MT 59601

and error-correcting process, and nature, in marking man's papers, will grade him for wisdom as measured both by survival and the quality of life for those who do, in fact, survive.

The way I'd like to handle this this afternoon, as we discuss some of the concerns that relate to the grades that we should receive as regulatory agencies, as research groups, and so forth, is simply to entertain questions. And I suggest that you address it to the speakers directly. If there's a problem understanding, we'll have the respondent repeat the question. Are there some immediate questions from the audience now? I think we'll just proceed and we'll keep going as long as there's interest and questions keep coming to the panel. So question number one, please? (NO RESPONSE) Well, question number two, please? (LAUGHTER)

Q MR. McBRIDE: My name is John McBride, St. Regis Paper Company. I think this would go to Ed Chen. Does it appear that most of the major problems that we are seeing with chemicals are the result of mis-applications, accidents, rather than deliberate application? And if it isn't you, would anyone else want to comment on this?

A MR. CHEN: I don't think most of the incidents I think you're talking about are deliberate. I think they're more due to negligence and, as Dr. Rom said, not enough pre-market testing of chemicals like the PBB incident. When that was discovered, very few people knew what PBB was and a lot of time was spent to find out what this thing was.

Q MR. McBRIDE: I understand that, but the PBB was not deliberately applied. It was the result of an accident, in this case; it shouldn't have been there at all.

A MR. CHEN: That's right. As I think Dr. Selikoff has said, you just shouldn't make candy and poison in the same shop, which is exactly what happened there. It was an accident.

Q MR. McBRIDE: Yes, it was an accident, but it wasn't a direct application, whereas you could get -- say, DDT could cause problems with direct, deliberate application, whereas the PBB would not.

A MR. CHEN: That's right, because PBB was never intended to in any way come close to the human food chain.

Q MR. McBRIDE: Did you feel that most of the problems we had are just inadvertent, or side effect, or that the deliberate application has side effects we don't anticipate?

A MR. CHEN: I'm not sure I quite understand.

Q MR. McBRIDE: We may deliberately apply a chemical -- well, let's use the Alcea, Oregon case. Here we have cases of 2,4,5-T, 2,4-D, being deliberately applied and in some people's minds -- not in my mind, but in some people's minds, there is spontaneous abortion resulting from this. This isn't a case of, say, PBB which is not supposed to be there at all, wasn't supposed to get in the food chain at all but it did. One's an accident; the other has side effects in a deliberate application. Do you see what I'm driving at there?

A MR. CHEN: Yes.

Q MR. McBRIDE: Do you feel that most of the problems we see, most of the major problems, are the result of deliberate applications, as in brush spraying, or accidents, as in PBB or PCB?

A MR. CHEN: I think a lot of accidents occur because of some direct application for which a substance has some use, if it was used as it was intended to. But often, as we know, these chemicals escape from their intended uses to poison the environment. A lot of times it's sheer carelessness or stupidity, negligence, not enough perhaps governmental regulation. (LAUGHTER)

MR. McBRIDE: I would only say I don't think any governmental regulation ever prevented stupidity. (LAUGHTER)

MR. CHEN: No comment.

MR. SCHWINDEN: You wouldn't comment that some regulations arise out of stupidity, would you?

MR. McBRIDE: No comment.

A MR. HEALTON: I'd like to say that I think if we counted numbers of incidents, that the number is probably equal in number of times that deliberate application and accidental application are causing problems. In terms of the magnitude of the problem, the problems are probably greater in the number of people they affect in the accidents such as the one we had here, the one in Michigan with the PBB. I think the numbers of people involved are greater because there is a multiplication through the animal feed to the animal to people. The number of people affected seems to be greater. A side incident on the PBB thing, another place where we eventually found PBB, the same chemical, is the fact that in pulverizing that chemical in machinery totally having nothing to do with anything -- they were making it for the plastic industry -- in grinding it in grinders, and then they would turn around and grind pharmaceuticals in the same machinery. Another example of the way accidents can lead us where nobody ever intended them to go.

A DR. YOUNG: I can't get away from that chair because I'm from North Dakota. (LAUGHTER) I'd like to make a few comments on that. I think that the question, as I see that you're asking, is the incidents of total chemical-induced toxic effects and whether it's accidental or put into an effect because we were trying to achieve an end, to treat something. My response to that would be that I feel that it's more based on ignorance, and this gets back to research. I think that there's a lot of research that needs to be done on chemical effects, the toxic effects. If we look at the total spectrum of chemicals, we can find that we haven't even scratched the surface on understanding how

chemicals are metabolized, and for instance, how many intermediary metabolites are produced. Some of these chemicals taken into the body produce a whole host of chemicals, and then these can interact with other chemicals. That rat that's in the cage that's receiving the equivalent of 300 bottles of pop in artificial sweetener is not smoking, is not eating pastries, is not living the lifestyle that we are. So that when you try to extrapolate -- and Dr. Newman made this statement, that it's difficult to estrapolate from that in vitro test from the laboratory to the human situation because we are inundated with all types of chemicals. Now, on the other end of the spectrum, if you look at the therapeutic use of chemicals, I would say the most toxic chemicals today administered to humans is in anti-cancer drug therapy, the nitrogen mustards, the types of alkylating agents. Now, some of those are used therapeutically, of course, for their cytotoxic or killing effect on cells. Even some of those are being misused by physicians in non-life-threatening conditions. For instance, some physicians are using anti-cancer agents for treatment of psoriasis. And some of those patients may develop a life-threatening condition from that treatment. So the toxic effects are there. The treatment is there in pursuing one avenue, and I guess this fits into the therapeutic misadventure that I was talking about earlier this morning.

One last comment is, I think that, as Bill mentioned earlier, that a lot of this involved in the shoe-leather investigation of the Sherlock Holmes in tracing things out comes around to a serendipitous discovery or observation. The technician that went to lunch and left the chromatograph or whatever it is running so that the peak would show. You go back to 1929 when Fleming went on vacation and instead of throwing his petri dishes away, when he came back, noticed that there was a mold growing on one and the bacterial colonies were gone. So that to me, the powers of observation, data collection, careful scrutiny, is all going to eventually pay off. Again, pointing back to investing some time and research to try to better extrapolate from these species' tests. It's well known that species vary in their response to chemicals. Some species, the chemical may be a thousandfold more toxic. You look at the thalidomide crisis. Man is much more -- for women it's just much more toxic than the laboratory animal population, so lab tests really didn't tell us anything.

A DR. ROM: In response to your question about, are these deliberate use of chemicals or are these accidental situations -- I think that for evaluating some of these toxic exposures, the real environment that needs to be looked at is the occupational or work environment where there are employees. Usually employees are exposed to the highest levels of toxic compounds, rather than the general public in an accident or deliberate use of chemical. So I would suggest that a worker who manufactured Agent Orange, 2,4,5-T, or other toxic compounds would be the ones to study to see if there are toxic effects or miscarriages or reproductive effects, etc. I think that more of the horror stories occur within plants, or perhaps never get into the headline stage of the Montana Standard or what-have-you. The other problem with the occupational environment is that the number of entities or diseases that may become manifest, they are things that are common, garden varieties of illness -- bronchitis, chemical pneumonia, skin rashes -- but the big worry things, such as cancer, don't manifest themselves until a long latency of twenty or twenty-five or thirty years have transpired and the company has gone out of business and everybody has forgotten about this episode.

In our society, it's the dollars and cents situation, and if there is an in-plant contamination, it must be thoroughly, scientifically proved to the last entity, i.e., arsenic causes lung cancer and it's not the cigarette smoking in all the smelter workers at Anaconda. To prove that is extremely difficult, because a smelter worker smokes, gets exposed to arsenic, gets exposed to SO_2, goes home, gets a little PCB, and it's multifactorial environment. So as scientists, we have a very difficult task, but I think in concentration on research, and research in the occupational environment, we can come up with a few answers or a few leads.

MR. SCHWINDEN: Question number one. Next question?

Q MR. DeCOU: Bill DeCou, Missoula County Health Department. This question is to Dr. Rom. On the third epidemiological study in the PBB incident, you talked about the Michigan Health Department finding no relation between serum levels and symptoms. Since that was done some two to three years after exposure, would you still have expected that there would be serum levels present, and would the absence of the finding of serum levels connected with symptoms still be relevant then?

A DR. ROM: They found serum levels present at very low levels. I think that was probably the wrong place to look. Probably the right place to look is in the fat, and if there would be a correlation, it would probably, if it did exist, would be from adipose tissue to biological complaints.

Q Mr. DeCOU: Do you think there would have been a connection between fat levels and complaints?

A DR. ROM: Fat levels and complaints. Well, as an unbiased observer, I'd have to say maybe, maybe not. (LAUGHTER) I would say that's the place to look.

MR. SCHWINDEN: Next question?

Q MR. YORKE: I'm Alvin Yorke, with the Environmental Protection Agency. I have a question for Dr. Young. You were talking about cancer-causing agents this morning, and also you mentioned promoters and their co-agents or whatever you might call them. You were also talking about research that's been -- as containing an element of cancer. How much research is being done, if any, of the relationship between mental and psychological stresses of a person in terms of his susceptibility to cancer, regardless of the agent that might be involved?

A DR. YOUNG: I'm sure that work is going on. I can't really give you any information other than, as you are well aware, the psychological aspects and the fear that the statement of cancer generates is well known in our society. One out of every four of us will develop cancer during our lifetime. So with that known, people are somewhat hyper-immunized and of course, the news media helps a lot, too. When there's a recent possibility of a toxic chemical producing cancer, this information adds to creating a psychological stress. As Dr. Newman mentioned, I think that we would say ten to twenty percent of the population of births in the United States will be evidencing some form of birth defect, also. And there is a degree of worrying that goes on. The

psychological effects, I personally feel, in my own opinion, play a tremendous role in the longevity of some of these patients. Their acceptance of the disease, the understanding of the therapy, the different modalities that are used, and the eventual outcome of the disease. Maybe somebody in the audience -- I know there are a few behavioral toxicology types in the audience that might be able to better answer your question.

MR. SCHWINDEN: Any volunteers? (NO RESPONSE) Next question?

Q MR. FERGUSON: My name is Ferguson. I'm with the British Columbia Ministry of Environment. I haven't got a question so much as, perhaps, a statement, and maybe this would elicit some comments from the panel. There was some comment made this morning about the fact that administrators and perhaps politicians in Michigan weren't being responsible in notifying the public of the incident that occurred, and Dr. Newman later alluded to the fact that psychology plays a very large part in the process of this anxiety situation. My question is, when does an administrator or politician break the news to people that they may be affected? And secondly, is he being responsible or irresponsible in advising them that they may be affected, later to find out that they aren't affected? Has anybody got any bright ideas on this? Because I find myself in this position once in a while.

A MR. SCHWINDEN: We all do. Somebody want to take that on? (LAUGHTER) What was your phrase,"as an unbiased observer, maybe, maybe not?" Well, let me respond just very quickly, because I can remember a particular incident, and I suppose that if you look at it from the political point of view, for a whole variety of reasons -- which I would be happy to expound on -- I guess it's better to make the mistake on the side of prompt public notice. And I think of our experience, Larry, with the radon situation in Butte, in which Mr. Lloyd came over with people from the Health Department, and we had some very inconclusive evidence on the existence of radon daughters in the Butte area. And we were trying to answer in a very real way that same kind of thing, and decided that the one thing we would try to do, was in the initial release, to try to tell it as it really was, that we didn't know all the answers. But of course, once you mention anything which has radioactivity, it brings up visions of mushroom clouds and, as someone said, the big "C", and so you have those kinds of problems. But I guess from a political point of view -- because the first time you see somebody from the Health Department walking down the street carrying a geiger counter, somebody's going to tell the press anyhow. So you might as well tell them yourself, and at least you get the first shot to try to tell it the way that you'd like it told.

A MR. HEALTON: I think that last remark is exactly what I was going to try to say, and that is, in the environment we live in today, you can't hide anything. And I think we are more and more moving to trying to make an announcement at the earliest possible time. At the same time, you need to make sure that you have some facts to talk about. And one of the things that's happened in the past is that, in some instances, there have been attempts to be up front so far in advance that we didn't really know what we had in the way of information. There's a balance between the first hint that you have a problem, and when you know you have a problem. I would say that, when you know you have a problem, then it's time to talk about it. When you have a hint -- we've had some instances in which a press conference was scheduled,

the people were gathering to go to the press conference -- this is something that had been going on in the State of Minnesota for three days, we had reached the point where we knew we had to tell people about it, that there were PCBs in their turkeys -- and within thirty minutes before the press conference took place, we discovered that in fact, there had been a screwup in the laboratory and there wasn't any PCB. Luckily, the press conference didn't happen. The reason it didn't was that we had asked for check-analysis to make sure that we knew what we had. And I think that that would be my breaking point, anyhow, is once we are certain that we have the contamination, to tell somebody.

A MR. SCHWINDEN: I want to expand your question to another area which I think is directly related to what you asked, except that it's one that I think we increasingly deal with. What does the administrator, the politician do when, within the agencies, there is professional disagreement as to whether the evidence is conclusive as to whether there is a problem or not, and you have two professionals who walk into your office -- one of whom is willing to say, based on sixteen years of experience in the field, that there is no potential problem; and the other fellow, you know, says, you wait six years and you're going to see all kinds of people with lung cancer or whatever. How do you handle that problem, where you've got conflicting data from people of ostensibly equal professional capability? Would somebody discuss that one? How do you handle that one? Because that comes before the question you asked. The worst thing that you can do is go to the public and stand with two people and say Dr. Jones says this and Dr. Smith says this. I don't know what you tell them.

Q MR. FERGUSON: That's exactly one of the things I was getting at.

A DR. YOUNG: I think that's an excellent point, and unfortunately, the scientific media is full of that controversy. If we look, today, everywhere from a Nobel laureate to the graduate student is publishing scientific, recognized articles presenting different forms of interpretations of similar data. I would say that you're looking at two groups of people that have to inter-communicate, and that's the administrators and the bench scientists. I think the bench scientist proceeds with a high degree of caution, usually because of the number of times they've been beaten under the bench because they did not have statistical evidence or hard facts. Therefore, they are, I think, much more cautious. They may have some data, but they're not willing to take a stand and influence some process in the industry to close down a plant. That's where the administrators come in, and that's a very difficult decision when you have two professionals giving you two different opinions.

A DR. ROM: In the environmental field, we have a few things that are facts, and our problems run into us when people extrapolate from those facts to either other circumstances or other situations. We know that asbestos causes lung cancer, mesothelioma, etc., when you breathe it. But when you drink it -- we are on very shaky ground scientifically about whether that's going to cause certain stomach cancers, colon cancers, etc., because that's not proved or less proved. What does an administrator do then when he has the problem of people drinking the stuff, where the science is not good. Do you err on the side of caution, or do you err on the side that it's no problem. I think most people like Dr. Selikoff always go on caution and plus two. I would say at least go to the caution side. The problem is that a lot of the science takes not only months but years to generate the answer. In some cases, the answers may

never be generated. We're dealing in an environmental area, I think, where the science is poor, because it doesn't exist. So I'll make a plea for funding. (LAUGHTER)

MR. SCHWINDEN: It's hard to keep a plant shut down for years until you get the answers, too, and that's the other side of the regulator's point of view. Other questions?

Q MR. LLOYD: I'm Larry Lloyd, with the Montana Department of Health and Environmental Sciences. I would like to direct this to Dr. Rom. I was quite interested in your presentation this morning relating to asbestos, and particularly ingested asbestos, in that you alluded to the fact that it is absorbed through the gut to the blood and deposited in the kidney, where you are projecting that it is creating excess kidney cancers. The questions that I would have, is this more or less specific to any particular type of asbestos? If so, do you have any information on the fiber size, and another related question -- do you have any information pertaining to inhaled asbestos being absorbed into the bloodstream from the lung and finding its way to the kidney?

A DR. ROM: That's an excellent question. There is only one study that shows cancer of the kidney increased in people exposed to asbestos. This is a study by Dr. Selikoff and his cohort of 17,800 asbestos insulators in the U.S. and Canada that he's been following since January of 1967. He's published a ten-year followup of the study that has come out in December of '79 in the Annals of the American Academy of Sciences. There he found a statistically significant increase of cancer of the kidney in this group. These are asbestos insulators, so they are working with insulation materials. These are predominantly chrysotile in their nature because that's the major form of asbestos used in the industry, about 94 percent. They may have some other asbestos type exposures. These would probably be crocidolite or amosite, but they would be very small. I have no information, and I don't think he has any information on what size of fiber that may be absorbed or found in the kidney. In January, 1980, two months ago, it's been reported in Journal of the Chest an evaluation of asbestos workers with asbestosis and pleural thickening where Dr. Auerbach at the Orange VA Hospital in New Jersey, has looked at all the various tissues in about fifty cases, looking where the asbestos goes. And he has found it virtually everywhere he has looked at in the human body in orders of magnitude greater than other organs when they have asbestosis than when they have pleural thickening, i.e., a dose effect. He and Dr. Selikoff, as far as I know, have never looked at size distribution in these various organs to make some inference as to a size relationship. You probably know that at least mesothelioma, the theory on carcinogenesis for that tumor is relationship to the physical size and structure of the asbestos fiber, rather than a chemical or ionic or other means of carcinogenesis. This is a long, narrow fiber .25 to up to 1 micron in diameter to 8 to 60 microns in length. That is from Stanton's work. I'm unaware of other studies that have shown the kidney to be increased. I think before we accept that, it would be very nice to have confirmation by some other investigator and some other type of cohort. I think that answer may well be coming, because there are a number of additional large cohort studies that are being undertaken. These are workers exposed primarily from inhalation route of exposure because they are insulators, rather than ingestion. The GI cancer business is thought to come from the mucus cilia ladder bringing up mucus and then being swallowed, generally subconsciously.

As far as fibers penetrating tissues, we know that they do penetrate GI mucosa. We also know they penetrate placenta, which is kind of amazing when you think of a mineral silicate fiber doing that.

Q MR. LLOYD: Thank you. I have one other short question. Are you aware of any research into standard setting for the utilization of asbestos-containing piping for water supplies?

A DR. ROM: I don't think I'm aware of any standards for asbestos in water. I think I'll have to defer to some other members. There may be in Canada, but I'm just not aware of them.

MR. SCHWINDEN: Another question?

Q DR. NEWMAN: Ted, I would like to ask Bill about studies that have been done on the PBB incident in Michgan relative to damage to germinal cells. Have there been studies on the females that were involved and also the males that were involved in this population with significant PBB levels to determine whether or not appropriate genetic counseling should follow, relative to reproduction?

A DR. ROM: Yes, there have been studies. There have been studies of Michigan farmers in regard to their sperm, and I think there have been studies also about reproductive effects through questionnaires. The results, as far as I know, have not been published, and I'm not aware of any results reported at any meetings that these have been done.

MR. SCHWINDEN: Other questions?

Q MR. ALKEMA: I have one question. My name's Ken Alkema. I'm with the EPA here in Helena. I'd just like to further expound, or have the panel expound, on the area involving the media and the public with the decision-making, or at least making them aware of what is happening. I'd like to ask Dr. Chen how he could suggest the government agencies keep the public through the media more aware of what's going on. What would you suggest, Dr. Chen, that we do to more involve the press in a way that will be productive, and also the public?

A MR. CHEN: I think on the question of when there are conflicts within the scientific community, perhaps the tendency in the past has been to work things out internally, but as a member of the media, my inclination is, let's not underestimate the intelligence or the common sense of the people, and that it's quite healthy to have a conflict of professional opinions be brought out into the open and present the conflicting views and let the public decide. As to how to involve the media more, I think most news media outlets do not have the resources to staff full-time personnel on the science or even the environmental beat. I think, clearly, more involvement in communication is needed between the regulators and the media in perhaps forums like this.

MR. SCHWINDEN: Next question?

Q MR. PEABODY: I'm Jack Peabody, with Chem Nuclear Systems. Being on the other side of the fence, after a disaster has to be disposed of, I'm kind of curious what happened in the PBB incident seven years later. Where is all this -- what happened to all the cattle that subsequently died or were destroyed? How were they disposed of, and so on and so forth. How was the problem finally rectified? Could you comment on that?

A MR. CHEN: Some of the contaminated animals are on their way out to Nevada burial site because nowhere in Michgan will the citizens any longer tolerate the burial of the animals. A lot of long-term studies are still underway. The results won't be known for decades. A lot of farmers are continuing to suffer. There's one farmer, for example -- and there are many like him -- who was publicly ridiculed by certain public officials as somebody who was trying to capitalize on the PBB disaster by shooting his cows rather than send them to the market. This man and his family finally moved out of Michigan, loaded what they had onto a truck, and moved to Missouri, where he, the last I heard several months ago, was still unable to obtain loans to get back into farming, because his loan applications were turned down for the reason that he didn't have enough experience. It turns out that the year PBB struck his farm and many others, he was supposed to have been named Farmer of the Year in Michigan. Many people, farmers who have just been wiped out economically by this disaster, have yet to receive any help. And nobody really knows what some of the long-term health effects might be, if any.

A MR. HEALTON: Another part of your question, I think, is what happened to all of the cattle. The State of Michigan set aside a large tract of land which was thought to be satisfactory for the disposal of such and it would, in fact, be capable of being sealed off so that it would contain the residue. They dug a large hole, lined it with plastic, filled it full of dead cattle, and sealed it over. There is some question as to whether or not the sealing is adequate. It's a long-term kind of study to find out whether, in fact, things will leach out of that dump site. But the thing that happened as far as the bulk of the cows that had to be killed at the high levels, they were, in fact, buried at a common site.

Q MR. PEABODY: Let me ask a followup question; whose responsibility do you feel it is to pay for this type of a problem after it has been identified? Is it the government's, the individual farmer's? The same could be said about PCBs or other hazardous chemicals after they're defined and all the handling be done and what the problem is, who's responsible to take care of it? Can you comment on that? Who did it in the PBB incident?

A MR. HEALTON: I don't think that decision has been reached by society yet. I think that the State of Michigan has foot its bill for a fair amount of the problem. I think the firms involved have paid a lot of money, or at least their insurance companies have paid a lot of money. I don't think the final decision has been reached yet. I think there is still a very broad decision that has to be reached by the political society that we live in as to how these things are going to be paid for. As Mr. Chen has indicated here, the people involved have paid a large price. There are an awful lot of individuals that didn't do anything wrong who have paid a price. The people of Michigan have paid a price. I think we've all paid a piece of that price. I think as a society, we haven't really decided as yet.

MR. SCHWINDEN: If you remember the first question that was raised this afternoon was a question that went something like this. What is the relative percentage of accidents that are caused either by misapplication, where you've got a known toxic, or by total accident, where you have a toxic agent that's not supposed to be in the food chain, and so forth. And I suspect that liability in those cases of clear negligence, and so forth, normally the court system handles that. But I think the point you raise is a very good one. If, indeed, we're going to live in a society where man-caused disasters are going to occur more and more frequently -- there is a fundamental inequity in the farm family that you talked about, and maybe it's because I'm a farmer, but I mean there ought to be some reservoir, some insurance, something at the national level which is funded either by those people who produce toxic materials, or something, which does cover accidents which have nothing to do with misapplication or ignorance. They are accidents. Other questions?

Q MR. MAUGHAN: My name is David Maughan. I have been wondering, in situations here in Montana, some of the ranchers we've known about who have had problems being in the proximity of toxic substances, immediately haul their cattle over to the livestock yard in Butte and sell them. Therefore, it seems that that's passed immediately on to the consumer, and that bothers me a little bit. It's again a question of how bad were they, or how bad are they, and what really should be done? I guess I was thinking Dr. Young is a veterinarian; maybe he could tell us.

A DR. YOUNG: That's more than a difficult question. As long as they only haul them to Butte, we're in pretty good shape. (LAUGHTER) If they haul them to Billings and Bozeman and Missoula, then we've got a problem. I would defer answering that question, because I know the State Veterinarian is here, and I think he's been much more involved in this process. Jim, would you like to respond to that? It's called "passing the hot potato" in North Dakota.

A DR. GLOSSER: Following these episodes, where there is known contamination, and so forth, you come back to the problem of indemnity. Whose accident was it and what problem? There's been a tremendous amount, in my professional career, of passing the buck, as my colleague, Dr. Young, has done, here, to the agricultural producers, and so on, is that whenever there is a cloud, first of all, you have to have clinical signs. You have to have toxilogical evidence of these problems. But in the areas that I've -- in the Helena area there has been a cloud of suspicion for thirty, thirty-five years on the agricultural community of animals and it has been highly disputed. In checking the animals, you have a polarization among scientific groups as to, "yes, there is a problem," in checking even differences in laboratory analysis. It's a dilemma. I don't think that I'm going to put in a pitch for the livestock producer or the agricultural producer. He is not--because of the nature of his environment, of using pesticides or of being victims of pesticides, is every bit as concerned about the quality of his product, because he wants a safe, wholesome product. If he doesn't have it, he isn't going to be in business very long. And I think this is one of the things that, in PCB or PBB episodes, we have found that there has been a tendency to look at the producer as foisting off his product because of a cloud. In quite the contrast, in the recent PCB episode, the producers that were victimized or who had been exposed to the PCB, were very concerned that they have a quality product; that has to be raised out.

I think this goes back to a question of society again, as to what are the levels? A no-risk society is an impossible situation. We, in this complex area, are going to have to recognize that there is a certain amount of risk or exposure to these contaminants. I think this is the big question that society is going to have to address in the future.

A DR. YOUNG: I'd just like to follow up on that question and relate back to where is the liability, and if I interpret the public law of 1976, which is the Toxic Substances Act, I feel that it looks like from that time on, the liability, or at least the buck-passing, finally stops with the industry. Because a policy statement in here states very clearly that adequate data should be developed with respect to the effect of chemical substances and mixtures on health and environment, and that the development of such data should be the responsibility of those who manufacture and those who process such chemicals substances and mixtures. It looks like in the future, future chemicals, the testing to show that these are at least of low toxicological potential or low carcinogenic or mutagenic capabilities, lies with the manufacturer.

And with the recent decision on the DES controversy where a young woman that had vaginal adenocarcinoma induced by DES that her mother received -- she won that case. And I couldn't find that report because, as Dr. Marsh, my predecessor had said, "filing systems are organized methods of losing things." I couldn't find that report, but essentially, the judicial decision there was that the chemical company did not proceed in a prudent and safe manner in testing DES for teratogenic effects. And if you look at the DES story and the investigative work that goes into that, there's many difficulties, and one is that in talking to the mothers that received DES during pregnancy, they are reluctant to recall that they received any therapy, because there's a guilt complex there. Their daughter has cancer and they feel responsible. So trying to generate the data in a retrospective study is difficult. That's far afield from the original question, but I think that in the future, I feel the liability is going to be on the manufacturing company, those that are putting these chmicals together in mixtures and disseminating them into the environment. Now you'll tell me I'm all wrong --

A MR. HEALTON: Not at all. I just want to attack one segment of that question, which is what knowledge the farmer had when he took the animals to the marketplace. It seems to me that, as we do in our agency at least in other areas, if the person knew that that animal had a problem and took it to market to try to beat the system and get rid of the animal before he got zapped, he's liable and I'd go after him. If the individual did not know that, then I wouldn't. And I think I would make a division at that point.

MR. CHEN: I think we need a lawyer.

MR. SCHWINDEN: Any other questions?

Q MR. JAMISON: My name is Van Jamison. I'm with the State Department of Health. In Mr. Chen's presentation, he indicated that the PBB standards that were used in Michigan were not in any way related to any sort of public health standard, and that they were related purely to what was detectable. My question is this: Would you gentlemen care to comment on your perceptions of the adequacy of our standard setting, and also could you comment on whether or not there exist no-effect levels?

A MR. HEALTON: First of all, let me say that I agree with him that, in fact, the standard was the lowest amount that we felt certain that we could detect and go to court and prove. The reason for that is that we did not know what the health effects were. The only measure we had was that we didn't think it should be there if we could prove it was there. You're talking about a chemical that wasn't supposed to be in food. As far as the food supply is concerned, that's what the food additives amendments are for and that's why we require proof in advance. And I have no problem -- if it's deliberately supposed to be in the food supply, it should be proved to be safe before it's put there. We should have the evidence. In this case, we just didn't have it.

A DR. NEWMAN: I think it's also important to emphasize once again some of the things that I tried to discuss, rather incompletely, is that it depends on what the population at risk is. If the population at risk happens to be a very young individual, or the pregnant female, the risk may be very high at a very low dose level. If, however, you're talking about exposure of mature individuals who are physically developed and so on, and that are out of the reproductive years, then it may be an entirely different question. So it just depends upon the exposure group, and where those chemicals are going to be deposited within the body. So no definitive answer is possible.

MR. SCHWINDEN: Questions? (NO RESPONSE) Fine. Thank you very much; thanks very much to the panel for their efforts this afternoon.

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MONTANA'S DILEMMA

Thank you very much, Gordon. Governor Judge did ask that I attend your conference this morning and pass along to you some concerns and observations the Governor has as a result of the so-called PCB incident that Montana experienced this past year. As Gordon indicated, the Governor had planned on being here, but the crisis which we're now involved in as far as the Milwaukee Railroad is concerned is preoccupying his time, and I don't know -- maybe next year we'll have a seminar on how to take care of a railroad in case your state happens to be losing one.

This seminar is based on an experience that we had last year. Before mid-September of 1979, most Montanans were not aware of what PCB meant, and toxic substance contamination was something that happened in other areas of this country or somewhere in a foreign land. A single accident here in Montana, the accidental rupturing of an electric transformer, and the subsequent leakage of 200 gallons of its PCB contaminated contents into almost 2 million pounds of animal feed, created Montana's first large-scale toxic substance emergency.

Later this morning some of the principals that were involved in this incident will give to you an indepth review of the Montana PCB experience. This will be presented by key leaders from our three state agencies and one federal agency which was most closely and critically involved in the response to that emergency. You will learn about their responsibilities, activities, concerns, problems, and recommendations for future actions.

The Governor was also closely involved in the response to the PCB emergency. And as a result of his experience, he has developed several questions which he asked be passed along to you, which he is hopeful you will be able to answer, to

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Presented by Jim Flynn, Administrative Assistant, Governor's Office, State Capitol, Helena, MT 59601

respond to, so that we here in Montana and those in other states and provinces who might be affected by it can perhaps be more adequately prepared to respond to another toxic substance contamination. He intends to offer some tentative answers to some of the questions and to include several recommendations for action. Other questions will need to be answered by you, who have particular areas of expertise, or the state legislators or the Congress, or some other authority.

First of all, we're concerned with how we can more promptly determine who or what agency is responsible for which actions when an emergency occurs. How can we most effectively minimize delays in taking needed action to reduce the risk to human health? In the Montana experience, many governmental agencies at local, state, and national levels had various responsibilities, and there was initial confusion as to what those responsibilities were and who should be carrying them out.

It is recommended that in the very near future there be clearly defined specific responsibilities so that each governmental agency at all levels -- federal, state, and local -- knows precisely what its responsibilities are and what activities it is expected to undertake. At the same time, we need to know what the exact capabilities of the responding agencies are -- what each can actually accomplish, as well as what each is expected to do.

Secondly, we need to know: How can we more effectively communicate within the state agencies, with agencies at other governmental levels, with producers, and with the public? How can we improve the coordination of all of our activities? Unless distinct lines of communication and coordination have been stablished prior to an emergency, not everyone will be immediately aware of what is happening. To address this problem within the executive branch, Montana is developing an emergency response team which, as a core group, will consist of a statewide coordinator, a laboratory certification officer, a legal officer, and a media coordinator.

It is recommended that a similar team be developed at the federal level. Between levels of agencies, we need to establish a communication network which will provide routine notification of all agencies which need to be aware of potential contamination threats.

Communication needs to be improved at the regional level, and the presence at this conference of persons from other western states and from Canada could provide the opportunity to develop that network. Montanans should be informed immediately of possible contamination problems in Utah, Idaho, or other neighboring states, and we, here in Montana, have the same responsibilities to inform those states of similar potential threats. Before this seminar adjourns, it is hoped that serious consideration be given to identifying at least one person from each state and province who would be part of a regional communication network.

Thirdly, we need to know: How can we expand our investigation and laboratory capability at both the federal and state levels to handle the overwhelming volume of samples and specimens which need to be tested and reported out immediately? And at the same time, we need to be assured that those tests are run by properly trained personnel using adequate equipment. We learned early in the PCB experience that we needed an expanded laboratory capability. Now is the time to inventory our laboratory resources, and to train and certify additional personnel and facilities to meet any future emergency.

Fourth, we need to know what can be done to assure adequate disposal of PCB or similarly contaminated materials. How can a producer safely dispose of hundreds of thousands of eggs and thousands of chickens? Tons of contaminated products had to be disposed of in Montana during the PCB experience in a manner which would prevent future contamination of either surface or groundwater. Landfills were used in many areas, and public health and other officials were again reminded that there is no hazardous waste disposal site in our state, and we need to aggressively search for and locate such a site here in Montana.

Finally, we need to know what we can do to assist the producer who is faced not only with having to destroy contaminated products, but also is faced with embargoes on their products which had been declared safe. Through diligent efforts of the Governor's Office, we secured a Small Business Administration loan operation to assist producers. However, this is only a fraction of the answer. What kind of federal indemnity program can be developed for those who suffer extreme economic losses when their products are quarantined or removed from the market? What can be done when other states embargo shipments from Montana, or any other state experiencing this problem. These economic issues must be given consideration by all of us, since each state has the potential of facing this. We need to explore what resources might be available or might be developed as disaster relief for these farmers and ranchers.

These are a number of the issues brought forth as a result of Montana's experience. Others, which are also important, include: The liability in law-suits resulting from governmental orders to destroy contaminated products; the costs of investigation and how limited agency budgets can absorb those costs; the risks to workers who have been exposed to the PCB; and several jurisdictional issues. We anticipate that most of these issues will be considered by those of you attending this seminar, and that additional answers and recommendations for action will be forthcoming from this group.

And finally, the Governor strongly recommends that this conference be the first of several in a continuing effort to bring together individuals in all fields and agencies who are charged with the responsibility of administering laws pertaining to the use of chemicals. We have had and will continue to have today an opportunity to share with each other our own concerns and our own experience in meeting this relatively new public health challenge. We need other opportunities to share; to plan strategies; to develop resources; and to become more aware of

our ability. Many of you in this room did not even know each other before this conference, and many of you will leave this seminar confident that there are many others upon whom you can rely. A tremendous lesson that many of us working in Montana in the PCB incident learned was that there were others within and outside our particular disciplines or fields of expertise who had valuable contributions to make to the overall effort. Working together, the Governor feels we can effectively meet the public health challenge of modern day chemical use, and he wished that I express his personal thanks to you for attending, and hoping that you will meet that challenge in a forthright manner and that, as these incidents occur in the future, perhaps each and every state working cooperatively with the federal government will be able to meet them in a more forthright manner.

Thank you.

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CONGRESS AND TOXIC SUBSTANCES

Four years ago, Congress passed the Resource Conservation and Recovery Act--a law designed to halt illegal dumping of hazardous waste and to impose some control on the process of treatment, handling and disposal of hazardous waste. The basic purpose of RCRA is to establish clear and unambiguous standards within a system of "cradle to grave" management of toxic wastes. Unfortunately, these standards are still not in effect because the Environmental Protection Agency has yet to promulgate its regulations.

But even when these regulations are in place, their vigorous enforcement cannot solve all of the nation's toxic waste problems. They will not, for example, provide for the clean-up of the thousands of unused, abandoned dump-sites scattered across the country. This glaring omission was probably due to two major factors: first, in 1976 no one knew how widespread the problem of improper disposal really was; and second, there was a general expectation that industry particularly the chemical industry would be more active in cleaning up their own abandoned sites.

In 1979, Congress and the Administration responded to the inadequacies of the RCRA by taking two major steps--rewriting RCRA and developing new legislation to deal with abandoned waste sites. The RCRA reauthorization, which includes numerous improvements and modifications, has now passed both Houses of Congress and is awaiting some final changes by the Conference Committee.

The new legislation, collectively known as "Superfund" is still undergoing "mark-ups" by committees in both Houses. There are half a dozen "Superfund" bills, representing wide differences in scope and complexity. Reviewing the differences of these bills and debating their respective advantages and drawbacks

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Presented by Christopher Harris, Attorney, Division of Land and Natural Resources, Department of Justice, Washington, D.C.

would involve a considerable amount of time. Consequently I would like to focus on a single issue--the standard of legal liability for generators of hazardous waste. This issue is probably the most controversial and actively contested of any aspect of the Superfund debate...the Administration is convinced, however, that a strong liability provision is essential if the problem of hazardous waste sites is to be dealt with effectively.

There are several basic questions which must be answered by any liability provision: (1) who should be liable for damages? (2) under what standard should such liability be established? and (3) for what portion of damages should various persons be liable?

As you know, the Administration's bill would answer those questions by imposing liability on generators, as well as upon others who cause or contribute to a release of a hazardous waste. The standard imposed on generators (and others) would be one of strict liability. All the parties involved in causing or contributing to any release including generators would share liability on a joint and several basis.

There are three basic reasons why the administration has taken the position that a strict, joint, and several liability scheme should be applied to generators of hazardous waste: (1) legal authority supports the imposition of joint, several, and strict liability on generators of hazardous waste; (2) public policy considerations establish a compelling basis for imposing such standards of liability on generators; and (3) the Superfund program may not have adequate funds unless generators of hazardous wastes are liable to the fund on a joint, several, and strict liability basis.

I would like to begin with the point that the current case law is generally supportive of the assignment of joint, several, and strict liability to generators.

While there have not been cases exactly like those we are addressing here, the basis for imposing such liability exists now in the most analogous areas of the law. I am referring to the precedents involving ultrahazardous activities, and those involving unreasonably dangerous products. It is logical to assume that the courts will apply the rules developed in those areas to hazardous waste cases as they begin to arise. There is no question, for example, that the law of product liability imposes joint, several, and strict liability on manufacturers of unreasonably dangerous products.

The evidence compiled through Congressional hearings on the subject of hazardous waste overwhelmingly supports the conclusion that the generation of hazardous wastes is an ultrahazardous activity. By their very nature, hazardous wastes create a high degree of risk that their release will cause substantial harm.

The Chemical Manufacturers Association conceded in its letter of March 3, 1980, to Senators Muskie and Culver, that strict liability for damages arising from the discharge of hazardous wastes has been imposed by the courts "on persons exercising legal control of the material at the time." They say "the staff working paper in this respect is generally consistent with the present state of the law. An owner or operator of a hazardous waste site may be strictly liable for injuries resulting from the release of hazardous waste from the site." (Id. at page 3).

The Chemical Manufacturers Association, however, fails to recognize the long-standing common law rule, that one may not contract away the responsibility for ultra-hazardous activities. This rule supports the conclusion that the generators of a hazardous waste are strictly liable for all injuries resulting from a release, regardless of who is in actual possession at the time of release.

I understand that the application of liability on a joint and several basis is the most controversial part of our proposal. Some seem troubled that a generator of only part of the hazardous waste that is released could be held liable for all the harm caused by all the waste released. Joint and several liability, however, is a long-standing principle of common law and has been imposed in a wide range of situations--from automobile accidents to the flooding of land and, more recently, to damages from hazardous substances. Joint and several liability is applicable whenever joint tort-feasors combine to create an indivisable harm. Moreover, it is applicable whether or not the defendants have entered into a business relationship or whether or not they have cooperated in any way. I can think of no reason why generators of hazardous waste should be excepted.

I have heard objection to the rule of joint and several liability in the hazardous waste context most often stated in terms of the one barrel hypothetical. That is, concern is expressed that under a joint and several liability scheme a generator that deposited a single barrel on a large dumpsite could be held liable for the total cost of the cleanup of the site.

Normally, however, the generator of that one barrel would not be held liable for all the harm of an entire dumpsite. The old maxim "De minimus non curat lex" would most certainly govern. In English that maxim means "the law does not concern itself with trifles." Courts have been mindful of this principle and have imposed joint and several liability only upon significant contributors. This is really just common sense. Under the common law only those who were a substantial factor in the harm are held liable even when liability is joint and several.

I feel confident that courts will use their common sense here also and will not impose full joint and several liability to those who were trivial factors in the damage. One can, of course, construct hypotheticals where one barrel is itself a significant cause of a large problem. A barrel of acid which, for

instance, leaks and then eats away other barrels at a site, causing them to release their hazardous contents could be envisaged. But normally, a single barrel would not be significant and the courts would simply not allow the one barrel contributor to be held fully liable.

I would also like to point out that the government can clearly recognize the inequity of holding an insignificant contributor liable for damage caused by others. The Department of Justice would simply not press a case against one whose contribution was an insignificant factor in a release.

Of course, if Congress does not wish to leave this matter to the discretion of the courts and the Justice Department, a clarification of the rule of joint and several liability to accommodate the insignificant contributor could be written into the Superfund. I would prefer, however, that you retain the general rule of joint and several liability and let the courts do what appears just on a case-by-case basis.

In brief, it is our position that the current case law, when one reasons by analogy, as the courts do, imposes strict liability and joint and several liability on those generators who contribute to a release. I am convinced that as cases arise courts will hold such generators jointly, severally, and strictly liable for releases of hazardous wastes. While the courts have not yet had adequate opportunity to apply these rules to the full range of activities covered by Superfund, one cannot imagine the courts failing to apply them to hazardous waste disposal problems.

Rather than wait the several years required for that day to come, however, Congress could remove all doubt now by reaffirming the common law in the Superfund legislation.

I would now like to take up the policy grounds that support the Administration's position. The big questions is, which rule will best solve the hazardous waste

problem and protect the public from harm? I believe our position, if adopted, will be extremely helpful in solving the problem and protecting the public. If not adopted, however, and generators are taken off the strict liability hook, the problem of improperly disposed of hazardous waste will be with us for a long time.

The basic reason for this is the judgment that the generators are the key people who must have the incentive to prevent releases. Indeed, to confirm strict liability for those who possess the hazardous waste, while exempting generators after they have passed possession on, will create a new, powerful incentive for generators to rid themselves of hazardous wastes as hastily as possible. This negative incentive will actually exacerbate the problem of protecting the public.

The policy reasons that underpin the judgment that owners and operators of disposal sites should be subject to a standard of strict liability are relevant and, indeed, even more compelling when applied to generators. The most obvious reason for imposing strict liability for an abnormally dangerous activity on owners and operators of disposal sites is the concept of control of the risk. It is obvious that those who control the hazardous waste are normally in a superior position to prevent its release than are those not in control.

But one must look at the whole process by which hazardous wastes come into existence, are transported, disposed of, and are released to cause harm. It is the initial generators who have the greatest control of the risk in the whole process, since they created the hazardous waste and its attendant risks in the first place. Obviously, generators have more knowledge about these risks and how to avoid them than any other party. Furthermore, it is the generators who determined to whom they would relinquish physical control, thereby setting the whole process of disposal in motion.

Society needs to insure, to the greatest degree possible, that those who control hazardous wastes throughout the whole process of disposal have the expertise and resources to handle those wastes properly. The only way society can insure this is to place on the generator of the waste the highest possible incentive to make sure that the waste is passed on to those that can fulfill these requirements. The best such incentive is strict, joint, and several liability. The generator thus must assure safe transport and disposal of the waste. If generators know that they cannot contract the disposal problem away and that, they must see disposal through safely, they will take far greater care than they would otherwise.

On the other hand, if Congress removes the strict liability standard from generators, they will have the reverse incentive, that is, to transfer control of their wastes as quickly as possible.

Generators of hazardous waste have several clear choices in how they handle their waste disposal. Generators may choose to reduce the amount of their waste, or find a use for it. They may choose to handle waste disposal directly. On the other hand, the generator may decide to entrust the waste to others who have the required expertise and resources. Strict liability will give them the incentive to choose the options in each instance that minimize the risk of harm and thereby reduce the risk of liability. To eliminate strict liability for generators, however, will actually eliminate the incentive for those options and will simply encourage generators to pass the hazard to others.

The most efficient and practicable method of avoiding that result is by assigning strict liability to the generators of hazardous waste. In so doing, Congress will keep the generators of hazardous wastes on the same footing as the manufacturers of dangerous products, and those who create other types of ultrahazardous activities.

I should also note, that a joint, several, and strict liability standard will encourage generators to remedy hazards created in the past as well as from creating new hazards. In enforcing section 311 of the Clean Water Act, it has been the experience of the federal government that the threat of ultimate liability has been a major inducement to clean up. Because of the generators' unique position with regard to knowledge of what wastes were disposed of, where those wastes may have gone, and knowledge of appropriate remedies and cleanup methods, their participation in cleanup is necessary to achieve Superfund's goals.

Finally, the issue of who should as a matter of policy bear the costs of disposal should be considered. The true cost of hazardous wastes should be borne ultimately by the consumer who benefits from the products involved rather than by the taxpayer or by innocent victims. Generators of hazardous wastes as a group are in the best position to internalize the costs of disposal and cleanup into the cost of the generators' products. Imposition of joint, several, and strict liability on generators is the best way to accomplish this.

The third reason for the Administration's position on liability is that a Superfund will probably not be successfully replenished without a strong liability provision. Without replenishment, the Superfund will not achieve the degree of success intended because the Fund may not be able to maximize the use of the authorized funds.

The central purpose of the various Superfund proposals is to provide the government with the funds for cleaning up releases of hazardous substances. In order to accomplish this purpose the Fund must be able to maximixe its resources. Most versions of Superfund assume reimbursement by some of those responsible for releases in order to provide sufficient replenishment funds for cleanup operations.

If the Fund is to rely on reimbursement as a source of additional money,

the liability provision must permit the government to recover actual cleanup costs without protracted delay and overwhelming litigation expenses.

If generators can be reached only upon proof of negligence, significantly fewer recoveries will take place. Those that do occur will be the result of protracted litigation. The Fund will simply not be replenished adequately on this basis.

Because of the projected massive costs of cleanup, we can expect that every penny available will be needed. Clearly, then, strong liability provisions, including joint, several, and strict liability for generators of hazardous wastes and substances, are necessary if Superfund is to be reimbursed and generate those additional resources necessary to assist in meeting the purpose for which it will be created.

One further word is in order, concerning the future of hazardous waste disposal. As you are aware, the chemical industry has sought the government's assistance in obtaining new sites for future disposal of hazardous waste. Yet, at the same time, the industry has vigorously asserted that it cannot be held jointly, severally, and strictly liable for activities covered by Superfund. For a town or an individual contemplating whether a hazardous waste site should be allowed to operate nearby, this attitude does not inspire confidence. If something goes wrong--such as contamination of the groundwater--is the generator of the contaminant going to be responsible for cleaning up?

In view of the industry's resistance to liability, that is a question which the government cannot answer for its citizens at this time. Understandably, communities are increasingly reluctant to allow sites to be operated in their vicinity. It would be far preferable for the generators of hazardous wastes to accept their full share of responsibility. But in the absence of their willingness to do so, an appropriate legislative response is the enactment of joint, several, and strict liability provisions as part of the bill pending before your committees.

MR. McOMBER: We are a little ahead of schedule. So inasmuch as Mr. Harris is willing to answer questions, are there any?

Q DR. WHITNEY: I'm Neal Whitney, from the FDA. Your presentation dealt primarily with disposal discharge of hazards and toxic substances. In situations such as Montana, it was a pure accident. The disposal and cleanup of the initial spill would have been a very simple matter. However, I don't see anything in your bill to protect the innocent against the effects of such an accident. In the Congressional Oversight hearings, Mr. Gore, of Tennessee, did address this. And I was wondering, is there anything in there that would provide assistance to --

A MR. HARRIS: Yes, there is. Someone who has their property damaged -- it's limited to property damage, as opposed to medical damage -- must first go after those responsible for the spill or the accident or the discharge. If they're unable to recover against that person, either because the person is financially bankrupt or can't identify them, then you'll be reimbursed by the fund. And if, for some reason, the fund is -- the Justice Department is able to find whoever it was, we can then go after them. But this relates only to property damage; it would include fisheries or crops -- but it's not related to medical damage.

Now, in the Culver-Muskie bill, which is S1480, medical damages are included. The Administration considered this very carefully, and we think that there are two basic problems with medical damages. One is, the proof of causation is an enormously difficult problem. Under the Muskie-Culver bill, it allows recovery basically based on a suspicion, so anyone who can construct a reasonable theory that the spill is related to their medical illness can recover, and we think that that will end up bankrupting the fund and prevent it from doing its basic purpose, which is to clean up the hazardous waste site. But as far as property damage is concerned, both the Culver-Muskie bill and the Administration's bill would take care of property damage, including crops.

Q MR. McBRIDE: I'm John McBride, St. Regis Paper. As a representative of "industry" -- in quotes -- one which, thank God, has very little hazardous waste involved, the question seems unresolved to me in the question of the reckless endangerment, criminal codes. Who serves -- if Mr. Shapiro faces the possibility of jail sentence for the actual acts of people that he never sees and doesn't even know exists in his organization, I can see why he is definitely against it. Undoubtedly he is well paid, but the man at the top is awfully well insulated from anything from maliciousness to stupidity of people in a big organization. And does the top of the organization serve the sentences? Who -- exactly where does the liability stop?

A MR. HARRIS: This is, in fact, an unresolved question of law which has troubled the Criminal Division of the Justice Department for some time. We would very much like to go after the top people. They either know, or should have known of their practices. The regulations under RCRA basically try to establish that liability by establishing a duty to dispose of carefully, and establish a duty on the corporation, including its management, to dispose of hazardous wastes properly.

Now, there is also another basic tenet of criminal law, which is that there is no such thing as negligence in criminal law. And it can't be an accident that you have no knowledge about. There has to be some mens rey, or criminal intent, and so joining these two concepts together, criminal intent as well as knowledge, or presumptive knowledge, is essential. Now the corporations are on notice, and EPA has made it quite clear that disposal has to be done carefully. Now if their truck driver, just completely on his own, decides to get rid of the hazardous waste at the nearest park, Mr. Shapiro probably cannot be held liable. But if he in any way is aware of that practice and condones it, or should have known and hasn't stopped it, we're going to go after that highest corporate officer. That's an unresolved question, but we are looking at that very carefully and will enforce these laws to the best of our ability.

Q MS. McCLELLAND: I'm Betty McClelland, from the Governor's Office at the State of Washington. And in Washington State, we're in the process of licensing and permitting brokers to handle these kinds of materials, plus utilize our waste sites, and we do have a waste site across the line in Oregon. Once this material has been assigned to a broker who's licensed, and then it's disposed of in a licensed site, and they've paid their perpetual care fund, under our state laws, the generator is no longer responsible. Now, from what you've just said, if something were to take place, it looks like maybe you could preempt and go back to the generator, and this would really cause some problems under the laws that we've just passed in our state to try to protect the public.

A MR. HARRIS: You raise a very good question. State law insulates the generator on liability. Is it fair for the federal government to come in and preempt state law? I honestly don't know if I have an accurate answer to that. Now that you've raised it, I'm going to study it and maybe I can get back to you and see whether, under any of these versions, whether the liability provisions would, in fact, go after the generator. Now, one thing that may distinguish it slightly is that the federal government, here, is picking up the bill and wants to be reimbursed for the cleanup costs. And if we find that there is a strong link -- in spite of state law -- between the generator and the careless disposal which resulted in some fairly heavy cleanup costs, we're going to try to go after them. But your question is a very good one, and I'm going to have to study that more carefully.

Q MS. McCLELLAND: Well, our management people really went over this problem for about six to eight months before we finally got the final language into the permit system and the licensing system. And the only place where we could possibly see there could be some difficulty, if we had a generator and a broker that might be linked, and possibly, then, linked to the disposal site. And so we've made some pretty strict regulations between generators, brokers, and disposal site operators.

A MR. HARRIS: Your system may, in fact, work so well that the question will never come up. But to answer the question, I don't have a finite legal answer on whether we could ever go after the generator, under state law which will otherwise insulate them.

Q MS. McCLELLAND: Well, I'm sure, after what you said today, this is going to get back to industry and they're going to be talking to Washington some more.

A MR. HARRIS: Well, they've been talking quite a bit. We're in battle with them every day.

Q (UNIDENTIFIED): Could you just give the numbers on those two bills?

A MR. HARRIS: There are several. The Administration's bill in the Senate is S1341; in the House, it's HR 4566. The Muskie-Culver bill, in the Senate, is S1480; and in the House, it's HR5290. Incidentally, there are several other bills, but they would be too complicated to go into all the different permutations of toxic tort acts and various superfund proposals.

Q MR. CALDWELL: Bill Caldwell, Montana Division of Forestry. I understand, from the first part of your presentation, that the manufacturer would basically be held responsible for an accident occurring regarding hazardous waste disposal? Is that right?

A MR. HARRIS: Well, through the standards of strict liability, under common law rules, if you're engaged in ultra-hazardous activity, such as blasting or using dynamite, or whatever, you can't contract away your responsibility and make sure that everything that happens along the way must be -- it has to be safe. It gets into a complicated area. But basically, you have the responsibility to make sure that all along the way that your activity is done as safely as possible. And even if something happens, you are responsible. We are applying that same legal theory -- which is well developed as far as liability law -- to the generation of hazardous waste. Someone who generates hazardous wastes has got to do something more than just turn it over to someone who's willing to dispose of it. And there has to be some responsibility on that generator to make sure that the person disposes of it and that it's done absolutely safely. And if it's not, that generator will be held responsible. Now, that would be under the superfund proposal. We would be creating that standard liability as a matter of statute. It current exists under common law, but we'd like to make it absolutely clear that it exists in statute. So once it's enacted, that's true. They will be held liable.

Q MR. CALDWELL: Does that also apply to consumers of the hazardous product? And is the manufacturer held responsible for their actions as well?

A MR. HARRIS: Anyone who owns, or is in physical possession of the hazardous waste, would be held strictly liable for it, whether you're talking about recyclers, or even the ultimate consumer. If you end up with a barrel of dioxane, you as an individual citizen, and you dump it somewhere, we're going to hold you strictly liable. Now maybe you don't have the funds to clean it up, but legally you'd still be liable.

Q MR. CALDWELL: I was misunderstanding a little earlier. I thought you were saying that, say, Dupont would be responsible for my handling of that dioxane.

A MR. HARRIS: Well, we've isolated out the manufacturers of products, if it's a product which eventually turns into a waste. That's not Dupont's responsibility. But if Dupont, in the course of manufacturing its product, produces a waste, it's got to handle that waste as safely and as carefully as it knows how.

MR. CALDWELL: Oh, I see. Thank you.

MR. McOMBER: Thank you, Mr. Harris.

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PCB PROBLEM CASE HISTORY - SYMPOSIUM

It's our pleasure to bring you this distinguished panel I have up here. They're all participants in the identification and solution of the problem of the PCB incident in Montana. They all had different roles to play. They have their viewpoints and their views of how the problem developed, how it was handled, and how each group functioned in a way that involved the cooperation of one to the other, what failed and what succeeded.

It's important that, when we're considering this type of input, that we keep in mind that there is a real tendency to try to fix blame for the failures. There's a definite trend in this direction, whenever you have this much interaction with this many agencies. There's federal government people. There's state agencies. Each of them, as I say, has their own version of what happened. This is what you're going to hear today.

Now, when we look at things and we fix blame, this is a real subjective, non-productive type of thing, unless we use that information to fix an objective system that will remedy the defects that happened in the incident. So essentially, we hope that it turns out to the point that it gives us a real way to fix on a response system that will produce the best results possible, if we do have another incident.

I'd like to introduce the panel now. This is Joe Blair, to my right. He's the acting director for Field Operations of the Meat and Poultry Inspection Program of USDA. And I have John Vodneck, with the Food and Drug Administration; Gordon McOmber, with the Montana Department of Agriculture; Dr. James Glosser, with the Montana Departnent of Livestock; and Dr. Arthur Knight, with the Montana Department of Health. Oh, and LeRoy -- sorry about that. Where'd you come from? We have LeRoy Gomez, down here, instead of John Vodneck. Oh, you're both here.

Moderator: John W. Howder, Ph.D., USDA, FSQS, Meat and Poultry Inspection, P.O. Box 2167, Olympia, WN 98507

Anyhow, as we start out here with this thing, we're going to allow about eight minutes apiece between the two, here, that are twins. So we'll start out with Joe, and then we'll turn it over to LeRoy. Okay?

MR. VODNECK: He's only going to allow us a small amount of time, and with what we've got here, I don't think it's going to be near enough time to give a complete synopsis. The reason that LeRoy and I are both here -- I was up here on the spot while he was coordinating things from our Denver Regional Office.

To give you a synopsis as I saw it, and as we saw it down in Denver, after the PCB actual contamination was found at the Billings plant, this was late on a Saturday afternoon; on a Sunday morning bright and early, the staff of Denver got together and at this time, the decision was made that I would immediately come to Montana and meet with the State officials. The meeting was set up before I left Denver on Sunday evening; we met at 8:00 on Monday morning. This included representatives from the Governor's Office, Health, Agriculture, and Livestock.

At this particular point in time, we knew that we had a major problem, and we tried to set up lines of communication and, at this particular point in time, I asked the State what assistance they could provide. In this course, the Agriculture and Livestock did have field people and they were immediately dispatched to work with our people in the field.

I was also provided office space and secretarial help by the Department of Livestock, and they were given an overview by our man who had been in Billings and has a supervisor down there and could give an overview of what we knew up until that point in time. The lines of communication were set up, not only between our operation in Billings, myself, in Helena, but with the State agencies involved and back to our district office, at which time we decided that conference calls on a daily basis at a particular time would be beneficial to all involved.

So this was the communications network that was initially set up. Something that people don't realize is the logistics in this type of situation, where we have a number of people out in the field collecting samples, trying to pinpoint a particular product or products, as the case may be, and getting those samples from the wilds of Montana into the cities of Denver, LA, and various other laboratories that were being coordinated.

In this particular instance, the major feed manufacturers were located in the cities where air transportation was available. Our people were then headquartered in these areas, outside of the Lewistown area. In Lewistown, we made an every-other-day run of samples into Great Falls for shipping. Now just shipment of samples is a tremendous task. Also, when you have people coming in from all over the country to help in this, you have to arrange automobile transportation for them; you have to get sampling containers. So the logistics in this is something else. I remember when I called up the local Motor Pool, here in Helena, and I asked for seven cars, it about blew the Motor Pool Manager's mind, but he'd just unloaded a truckload of new ones, and we had brand new automobiles to operate with.

Getting back to the sampling, there was some confusion between why we did things like we did. Basically, we have a set procedure because we never know when we're going to end up in court. And that's why the size of the sample, the type of container that was used, etc., was taken care of.

Going back to the laboratories, now, for a small minute, the laboratories were being coordinated by our laboratory in Denver. Samples were to be shipped -- as the people collected them -- were to be shipped to the various laboratories. Now the laboratory situation -- at the particular point in time, we could not get in contact with the Denver laboratory to receive instructions as to where the samples should go. Now what do you do in a case like this? We instructed our field people up here at that particular point in time to ship them the way you shipped them the last time. Just get them the hell out of Montana and let them

worry about them and trans-ship them if necessary.

The Bozeman lab was in contact with our laboratory, and they finally got on string and were able to run samples, but this was down the road apiece after the contaminant was found. Initially, I worked between our laboratory and the laboratory director down there to set up a procedure and apply any assistance that they could and initially, what we did was we split some samples with them as a quality control, and only a quality control check.

And then some confusion was raised, not only within our own organization but other organizations, about why, when we went out, and the various feed mills, that we cut off at a certain point, in the case, up here, at 1,000 pounds. Well, a meeting was set up between Dr. Glosser, Gordon McOmber, and myself, Eugene Morong, our other man who was up here from Billings at that particular point in time, and it was decided that we had to have a point that we would cut off, and this was for several reasons. Number one, we were running into small lots, cash sales of small items, and we figured that if a fellow that only bought a thousand pounds, then the chances are that would have been fed out. This was cleared through LeRoy, in Denver, and he got the okay to go ahead with this.

One thing that was very frustrating, not only to our people onsite here in Helena, but also to our field people who were right in the middle of this thing, the Eckhardt committee called a Congressional. We had to stop our people, get in hard copy, and so forth, and I would like to make a strong recommendation to anybody that's got any influence with Congressional Delegations, during the middle of this thing, let's not try to have Congressionals, because all that does is cause a bunch of interruptions.

During this period of time that we were stopping our people so that they could get hard copy reports in, the State continued to sample and to get the samples in. Information that we had gathered from the onset with meetings with

USDA was passed back and forth. By the end of the second week, we began to get more and more information, and this was also passed on to USDA by telephone over to Dr. Spear, in Butte, and Mr. Schullerts, who was here from Alameda.

We were getting sample results back and Dr. Spear and I were communicating by phone on a daily basis, and then I was passing on USDA's results to the states and feeding information back and forth in this manner.

When our phase wound down up here, we had a closing meeting, at which time I asked the State to appoint one individual up here as a primary contact. At that particular point in time, all the sample results were not in, and when I got back to Denver, then, I would call the contact up here, as more information became available, I would follow that up through the FDA NRSTEN system, which in Montana is located over at the Department of Health, with hard copy of the results, and he would feed the information to the proper people here in Helena, and that seemed to work out fairly well.

In retrospect, looking back, there are things we could probably do different, but we're still in the process of studying some of these items. But overall, I didn't think that our operation went that badly here. There were probably some lines of communications with other agencies which should have been opened up earlier, and more information passed, but overall, I thought that from the FDA prospect, our cooperation with the state agencies was tremendous and I again would like to personally thank the group of state agencies involved, again, in front of this group. LeRoy?

MR. GOMEZ: I guess you all know that the Montana incident began with the identification of PCB residues from some chickens that originated at Ritewood Farms in Franklin, Idaho. The source of the PCB-contaminated feed was then identified as Pierce Packing Company, in Billings, and subsequently the cause of the contamination being identified as a broken, spare transformer at the Pierce Packing Company

in Billings. That basically was the information we had when we began the investigation. Questions that arose that will arise in any chemical contamination incident will include the following -- and these are the ones that we attacked:

First, how extreme, or how extensive, was the contamination? What time period were we talking about? Through the collection and analysis of the samples, we pinpointed the period of contamination from approximately June 25 to about the middle of September.

Next question, how much product was involved? Who did it go to? What was the distribution pattern? What were our options in terms of the best way to stop contamination? That was our first concern. How do you make sure that goods are no longer being contaminated? How do you get contaminated products off the market -- through a combination of voluntary means, through State embargoes, or through federal procedure actions or adjunctive actions. We had to explore all of those alternatives.

One of the questions that came up early in the investigation: Should there be a lead agency? And if there is one, which lead agency should that be? That's a question that should be addressed by any organization should they be unfortunate enough to have a contamination incident in their particular territory. What legal authorities are available to control the problem? During one point in the investigation, we were advised that the Food and Drug Administration had jurisdiction over shell eggs in intra-state commerce, or within states. And subsequently, we were advised by our legal people that, no, we did not have jurisdiction. This caused a problem, as probably will be discussed in the legal panel discussion.

What are the gaps in the regulatory authority? Again, retrospectively, we can see that there are gaps both in state law and in federal laws in terms of trying to control a situation like this. What are the tolerances or action levels that can apply? We were fortunate in that we were able to get quick response

out of our headquarters in identifying the legal action levels that were involved.

Who should be involved, and at which stage of the investigation? What are the resources and manpower available to you? We in the Food and Drug, and particularly at Denver, were quite fortunate. Our agency took the position that you have all the resources that you need. All you need to do is ask. Whatever it takes to control the problem. In our case, we brought people in from other districts and we cranked up other laboratories. We have laboratories in several of our districts around the country, and there were about a half dozen laboratories that got cranked up, working split shifts, working sixteen hours a day, working overtime and weekends, in order to complete the analyses.

Who needs to know? Probably one of the major questions and one of the major problems, and that is establishing a communications network. We had difficulty, some times, getting ahold of the people in the field to relay instructions, and then also, something that is being tackled within the agency right now, and that is, who in headquarters in a given emergency situation needs to be advised? Because we were getting inquiries from people in several different organizations, from the headquarters level; everybody was interested and they were calling different people in the district trying to get information. And this was an unnecessary burden, particularly for the people at the field level, trying to respond to everybody who wanted to have some information.

Coordination for media reports. This was a problem in Montana, and I don't really know of any real solution to that. I hope that the panel on media gives us some very significant guidance on how to respond to the myriads of reporters who, particularly in the Montana incident, were extremely interested in outdoing each other in terms of making a big newspaper lead or providing new information.

What kind of indemnification procedures are available? And I was pleased to hear the presentation earlier this morning on what Congress is doing.

Who has the authority or the responsibility for issuing any destruction orders which are required for insurance or other claims? We found that people were requesting orders so that they could be indemnified by their insurance companies. There was also the anticipation that, if there were some government agencies that could provide some financial relief to the people that were destroying their flocks, their eggs, their herds, that there would have to be some kind of documentation so they could demonstrate that the products had, in fact, been destroyed.

What is the appropriate means of disposal, of destruction of contaminated goods?

I think those are the most significant things that we have to deal with whenever we get into this kind of chemical contamination incident. In FDA, we are now developing our procedures to fall on, the way that we go through an established line of communication, and establish the means of controlling these kinds of incidents.

In retrospect, in the investigation, I know that we had an opportunity to make an awful lot of mistakes. From my perspective -- and you'll have to admit and I'll have to admit that it's a somewhat biased view -- we did a good job of investigating and controlling the problem. We made few mistakes, and as time goes on, I get more confident and more pleased that the investigation went as well as it did. We were making major decisions with a minimum of information, with an awful lot of confusion, an awful lot of concern and alarm in the State of Montana.

I will close by again reinforcing Jon Vodneck's statements that we had tremendous cooperation from the state and local people from the State of Montana. And to me it was a classic in terms of federal, state, local cooperation.

DR. HOWDER: Thank you, LeRoy. The next speaker will be Dr. Joe Blair, from USDA.

DR. BLAIR: Okay, we'll run through these very quickly, because some of the materials will be repetitious of what we've already heard from FDA. And I'd like to point out just a few of the things that I think are peculiar or particular from the USDA vantage point. I think it's important to realize that the discovery of this particular incident occurred as a part of our routine residue monitoring program. And it's fortuitous that the one of three or four samples that were called for to be taken at Jolley's Wholesale Poultry at Provo, Utah, happened to be from that particular flock. If you can imagine the probability of happening -- getting that particular flock would be fairly low.

We've already gone through how it was traced back to the Billings, Montana, plant and the transformer break. If we can show the map, and show the distribution, now, of contaminated products -- (REFERS TO SLIDE) -- you can see the dot there, in Utah, being the Jolley's Wholesale Poultry; the Ritewood Farms, in Idaho, approximate location there where that dot is; and then the Billings plant in Montana; and then the states that are shaded shows the 19 states that received contaminated products. From one coast to the other, and also Canada and Japan.

The next slide shows our first action as far as trying to contain the PCB contaminated product. A, the distribution of the contaminated feed -- FDA has covered that, and we worked very closely with FDA in the states on that particular aspect. We accelerated our sampling program for animals and poultry coming in to slaughter to see whether there were other flocks or herds that might be involved that we didn't know about through the information we had gotten from FDA's investigation of distribution of feed. We initiated a whole new test program of suspected animals and birds and products. If they were coming from flocks that

had received the contaminated feed, they could not go into the food channels until they had been tested and found to be in compliance. We ordered the destruction of contaminated products. The Japanese people, through previous experience with PCB, placed sort of an embargo on American pork and poultry products, and they could not be exported to Japan without prior testing and negative findings. We accelerated our school lunch program testing, testing all products bought for school lunches if it contained poultry or pork. And that is continuing today.

The next slide gives you an idea of the volume of meat and poultry products and egg products that were removed or withheld from the market. Right now, the best we can figure, about six million pounds of product have been withheld from the market. A lot of that was animals that were destroyed in the live state, and I converted that to the dressed weight equivalent -- what it would have been, had that hog come to market, been dressed out, and gone into the food channels. So that's converted into the actual dressed weight equivalents.

The next slide talks about the three phases of our cleanup operation. And I'll leave the Montana certification program to Dr. Glosser, who was very instrumental in working with us in developing a very fine program that helped the state livestock producers, as well as our regulatory concerns, to get through a most sticky portion of the problem. There were two other portions of it, the testing of home consumption products, realizing that there were a number of people that had received contaminated feed and had fed it to their livestock, and were not marketing the livestock, but had it in their home freezers and were consuming it. The next slide talks about that.

We enlisted the aid of the county agents -- there were 42 county agents within the State of Montana that contacted the producers. We paid for the shipping and the analysis of the samples. We eventually, as of the middle of February, had run 431 samples. And much to our surprise, the violation rate, or the numbers of

samples that exceeded the tolerance level, was quite high, at the 20 percent rate. Some of them up to as high as 18 ppm. We thought that this was a very, very useful program, and it's pretty much winding down now, but still if there's a producer that's got some meat in the freezer and wants it tested, we're still receiving that.

Another part of the program was our producer contacts. We got the list from FDA that exceeded 2100 names. We got additional lists from recall lists from different feed manufacturers. And we had to make some contacts with people we had not gotten through the certification program. We made over 2270 phone calls, and there was about an average of about two phone calls per producer, so we contacted, in that effort, a little over 1100 producers. As a result of those telephone contacts and the information we got from that, we made some on-farm epidemiological visits. We were fortunate, at the time, that there were meat packing plants in Colorado that were on strikc, and we had some surplus inspectors that we were able to divert up here and utilize in a very intensive program of on-farm visits. We visited 450 premises. We gathered information for FDA on those visits and, I think, made over 350 reports back to FDA on the status of feed and things of their particular interest on those visits.

There were approximately 148 producers that either needed to be tested or qualified for certification if they would come forward with the information they had. That represents about six to seven percent of the producers contacted. Cooperation was quite good. We expect the cleanup operation to probably continue trickling in until the producers bring their animals in to market and -- well, you take hogs, we're talking about breeder flocks or breeder herds that are still out, and we've got a few laying flocks that are still out, and there's still some unknown premises that we've got to get nailed down. In this particular area, this remaining 148, we're counting on their continued cooperation and help from the state in cleaning this up.

Some of the things that we have learned from this and some of the things that we are doing differently because of this incident include: We have developed a contamination response system, and this contamination response system very detailedly spells out who's got authority for what and who's supposed to do what when different contamination incidences occur, who is to be contacted -- the FDA, EPA, state agency and the like -- and we currently have utilized that contamination response system once on kind of a dry run in Minnesota, on the one that was almost an incident and then we found out the laboratory error just thirty minutes before going into the press conference. We have utilized it in a rather extensive problem with dieldrin in Iowa. We're using it right now in a problem with PCB in metal siding in Alabama. We've utilized it on another PCB incident that's currently going on in Pennsylvania. We're currently engaged in training 2,000 of our field people in a contamination response program, so that they will know who to contact and what will happen if they should discover a spill or they should discover a positive finding due to the residue sampling program.

On February 29th, the FSQS proposed a ban on the installation and the replacement of any equipment containing PCB. We plan fairly soon to propose a regulation that would require the removal of PCB-containing equipment from federally-inspected plants, and we're currently seeking legislative authority for some of the areas where we feel like we've got some real deficiencies, and that is animal identification, of animals coming in to slaughter, and then the quarantine authority that is needed when you have a known-contaminated herd and you have no legal basis for containing that except saying that, when the animals come to slaughter, we're going to hold them and test them. And those are the areas that we're currently working in right now.

DR. HOWDER: Thank you, Joe. The next speaker will be Gordon McOmber, the Director of the Montana State Department of Agriculture.

MR. McOMBER: Thank you, Doctor. The PCB incident was regarded by the news media as one of the two biggest stories in Montana in 1979. The other one was the Milwaukee Railroad, and it looks like it's coming to a head today, too.

By the time Montana got the word on this spill, the accident was three months old. Of course, by that time, the contamination had gotten into the feed chain and out into the food chain in the 19 states and Canada and Japan. As of now, it's cost the producers of Montana in the neighborhood of $4 million. It's cost the three departments involved well over $100,000. It's caused some very hard feelings. Montana took a whipping, one that's not going to be forgotten for a long time.

I am very much encouraged by the actitivies of this meeting in establishing emergency action response plans to take care of this problem if it happens in the future, and from what I've heard yesterday and today, it very probably will. There will be other instances of this kind.

When we were notified of the accident, we, of course, immediately notified the Governor. The three departments, then, sat down over the weekend, reviewed our respective statutes, determined areas of responsibility, established lines of communications, and determined to meet regularly for the duration of the problem. There was and has been excellent cooperation between the three state departments involved. The Department of Agriculture has the legislative responsibility in the feed area. Livestock, under Dr. Glosser, of course, has animals. And human food is Dr. Knight. Dr. Knight just informed me that's why we were set up on the agenda in this manner, because first comes the food, and then comes the chicken, I guess, and then the egg -- something like that.

Our people were immediately alerted that they could expect some overtime, working weekends, and two division administrators that were involved in this -- Gary Gingery, from our environmental responsibilities, and Roy Bjornson, from the feed end -- were authorized to hire new people if they needed them, and of course, they informed their people that they could expect a considerable amount

of overtime.

The first of the next week, as John indicated, we did meet with FDA people, volunteered our cooperation, and really, we've established and continued a good working relationship with federal agencies for the duration. We were advised that we were to work under the direction and supervision of federal people, that we were not to take samples without oversight supervision, which policy we followed. Our position was and is that we were agents of the federal government under supervision of federal officials and carrying out the work of the federal government under federal regulations.

There were some problems. Some of the federal people were removed after they had learned what was going on in Montana and it was necessary to break in new people. Rules were changed during the game. The tolerances were changed, which created some problems and again, as John mentioned, there was a Congressional hearing that pulled the federal people out of the state -- or, at least, took their time -- at a very crucial time in the investigation.

We do find that, in the Department of Agriculture, our laws were not written with this kind of a problem in mind. Basically, we're concerned with label compliance and seeing that the claims of the manufacturer of the feed puts into the feed the proper amount of protein and so forth. Our statutes provide for blending. If a feed isn't in compliance, is low on protein or some other ingredient, the manufacturer-distributor can blend feed and get back into compliance. And of course, the Delaney Amendment doesn't tolerate that sort of thing. So as I said, there was a little problem there. Not a big one, but a problem nevertheless.

There was another problem when people started asking, "Who are we going to sue?" It gets down to the problem of who's going to issue the order to destroy the feed, in our case, and the food and the animals, with the other two departments. It sounds a little facetious, but those people were very earnest, and

inasmuch as the Department is already being sued for something like a million dollars over a potato certification problem, we weren't real eager to be the bearer of bad tidings that might cause the state some other problems. That was finally worked out, and the federal people did present the producers with that notification.

In conclusion, in this case, I don't -- this didn't have to happen. I know there are many chemicals in the country, hundreds of thousands of them. But in this case, I feel, and I think that there are many people in Montana that feel that this particular accident didn't have to happen. If the federal agencies and the Congress, whoever put this together, had pursued a policy of prevention as opposed to penalty after the fact, this shouldn't have happened. If the manufacturer of PCB had been notified to inform his customers, the people that make the electrical transformers, and they had been informed to notify the ultimate users, we feel that Pierce Packing could have been notified of the potential danger in those transformers, and the problem could have been avoided.

And I was a little disappointed in seeing the report by the Department of Agriculture, that again, the thrust seems to be to take care of the problem after it's happened. And as I said, I was disappointed that there was little, if any, indication in that report of effort that will be mounted from the prevention end of it.

Another problem we had was publicity. And this has been mentioned and we're going to hear some more about it. But some of the people became nearly hysterical through fear, and some of them exhibited complete indifference. It made our job very, very difficult. In the future, it would be very advantageous if the scientific community could get together and decide just how dangerous is the chemical? As I said, in this case, some people nearly became hysterical and some completely ignored it. We couldn't get a written statement as to exactly what the danger of PCBs were. Is it carcinogenic? Or is it not? Or it may be?

Or whatever. That was the problem that really hampered our operation.

Another problem is the question of indemnification, and that's been addressed here. I was very pleased to hear that. In this case, we feel that Montana was an innocent bystander, so to speak, and the regulation was being enforced for the protection of all the people in the country, and therefore, all the people in the country should help foot the bill. If the manufacturer, or the generator, or whatever you call the individual as referred to by the attorney on the matter earlier, isn't responsible, then we feel that all the people of the country should be responsible for accidents of this kind, and that there should be an indemnification program established by the conference to take care of that.

I would just emphasize, in closing, that again, cooperation was good within the state, between the federal people that come to the state, and the industry itself was very helpful and cooperative. And I think this task force approach is very admirable and certainly should be pursued. Thank you.

DR. HOWDER: Thank you, Gordon. Just as a matter to interrupt the train of thought here, the copies of the USDA report on the incident in Montana are available to whoever wants it, and if there are not enough copies, we'll leave a signup sheet and if you'll put your name on it, we'll be glad to mail them to you. The next speaker is Dr. James Glosser. He's the Administrator of the Montana Livestock Department, and he also is the State Veterinarian. Dr. Glosser?

DR. GLOSSER: Thank you, Doctor. I certainly want to second what has been said as far as cooperation and the approach to trying to solve this problem and minimize the impact on the industry and the public concerning the chemical contamination. I think at the grassroots level, the cooperation and working relationships were excellent.

The Department of Livestock first learned of the PCB problem in Idaho on September 11, 1979, during a telephone conversation with the Idaho State Veterinarian. At that time, it was speculated that Montana might be the principal state involved since the source of the contaminated meat meal at Ritewood Farms was alleged to be the Pierce Packing Company, Billings. In the ensuing week, the state agencies involved made and received innumerable telephone calls in a frantic effort to delineate fact from rumor and to enable state government to assess the public as to the magnitude and seriousness of the PCB spill into meat meal. For example, it was rumored that USDA had data as early as September 12 which indicated chicken meat was contaminated with PCB residues taken from a mixed lot of spent layers originating from two large Montana egg producing flocks. However, the state was unable to verify this until the following week in a meeting with FDA personnel.

During this period, efforts to objectively assess the problem were largely thwarted because of the paucity of information available; confusion as to what must be done to assist the FDA in defining the problem; and public hysteria which was generated by the media with constant reference to the cancer causing properties of PCB. The state initiated many telephone calls to the FDA and USDA Regional Offices to learn of recent developments. To improve communications, FDA sent an official to Helena to serve as State-Federal Coordinator.

The first official meeting between the state and federal agencies occurred on September 18, when the FDA requested a meeting of the Montana Departments of Agriculture, Health and Environmental Sciences, and Livestock to inform them as to the results of their investigation to date. At that time, FDA had identified the magnitude of the PCB contamination as widespread since it involved several large shipments of contaminated meat meal in major distribution centers in Montana. Preliminary information indicated that these lots had been used in finished feeds for egg producing chickens and feeder hogs. Moreover,

the USDA laboratory data of September 12 indicated chicken meat contaminated with PCB. At this meeting, FDA requested assistance from the state agencies to assist it in proceeding on with the investigation. It was decided that the primary responsibilities for the state agencies would be: animal feeds, Agriculture; assessment of health risks, poultry and eggs, Health and Environmental Sciences; and swine, Livestock. From the state's viewpoint, the meeting was extremely timely since it was both constructive and informative, but most important, it provided the agencies with a definite plan to cooperate with the federal government in conducting the investigation. The state agencies pledged their support at this meeting under the belief that they would be acting as agents of the federal government, an idea which, it was learned later, was a misconception, since the state believed the federal government had total jurisdiction in this matter.

Significant progress resulted in the following week as considerable information was gathered and evaluated and numerous feed and egg samples were collected. However, the large number of samples soon created a backlog in the FDA laboratories which resulted in long reporting delays. Moreover, as new information was gathered and released to the media, consumers became increasingly concerned as to the health risks that might result from consuming Montana eggs, poultry and pork products. As a result, the highly publicized investigation had an immediate serious adverse impact on Montana's agricultural economy. Informal consumer boycotts on Montana products within and outside the state created serious financial hardship since major retail stores removed most, if not all, eggs from Montana producers until the eggs could be certified as being safe. In addition, out-of-state slaughtering establishments discontinued buying Montana butcher hogs. The slaughtering establishments stated that they would not buy Montana slaughter hogs until the State of Montana could certify that the swine had not been fed any PCB contaminated feed, since they did not want to encounter

retained carcasses that must await laboratory analyses in their establishment.

The Department of Livestock made numerous inquiries of USDA, FSQS personnel to determine if such a certification program was acceptable. On September 25, the state agencies met with FDA and FSQS personnel to inquire if FSQS would accept a state managed certification program. Questions were also asked to determine what USDA's PCB tolerance for hogs would be and what sample size would be required for laboratory testing of hogs suspected of having been fed PCB contaminated feed. None of these questions were answered at that meeting. Therefore, the Department, with the assistance of the Montana Congressional Delegation, was finally given the assurance on September 28 by the FSQS that their inspectors would accept Montana's certification, thus alleviating the need for extensive sampling. The initial phase of the certification process was aimed at those producers who could certify that their swine had not been fed any contaminated feed. The criteria were as follows: "Commercial pork and poultry producers wishing to qualify for certification must provide the Department of Livestock with:

1. Legible photo copies of receipts or other documents of purchase showing the source of all meat meal, protein concentrates, and finished feed, purchased, delivered or fed since June 15, 1979.

2. Statement that no other commercial feed was fed to pigs or chickens.

3. Statement of number of pigs and chickens fed and the amount of feed used.

4. Statement of number of pigs and chickens on inventory to be marketed in the next six months. This certification applies only to those animals on inventory.

5. A sworn statement that all information submitted is true, accurate and complete, and in the event that the submitted information is not true, accurate and complete the applicant will assume all liability."

The state agencies were advised by the FDA state-federal coordinator that the Interagency Regulatory Liaison Group (IRLG) established the PCB violative levels for poultry at 3.0 ppm. He assumed the level for hogs would be the same. Since an uncertainty existed as to the questions of sample size and tolerance level for condemnation had not been officially addressed by USDA, FSQS agreed

to send a special staff from Washington, D.C., to Montana. They arrived on October 3. This staff was headed by Lou Gast, Deputy Administrator for Compliance. Other FSQS staff components included a Senior Staff Officer of the Residue Evaluation and Surveillance Division, the Deputy Director of the Evaluation and Enforcement Division, and an Information Specialist for FSQS. As a result of the ongoing discussions with this staff, the Department announced on October 9 that it could expand the certification process,with modifications, to those local producers who were, or may have been, affected by the purchase or use of contaminated feed. These producers were identified by feed distribution lists generated by FDA and the Montana Department of Agriculture that indicated PCB contaminated feed may have been purchased. The modifications were:

> "Local producers wishing to qualify for certification must do the following:
> Pork Producers: Arrange for a representative sample by lot of current inventory to be slaughtered at a federally inspected slaughter house and an official sample analyzed by USDA.
>
> Poultry Producers: Arrange for a representative sample by lot of current inventory to be slaughtered and an official sample analyzed by USDA.
>
> A representative sample consists of 5 hogs per lot, or 30 birds per lot. A lot is a group of animals or birds in one pen feeding from common feeders. These arrangements must be made between producers and slaughtering establishments.
>
> If the samples prove negative for PCB as conducted in a USDA approved laboratory, the producer is eligible to apply for certification by providing to the Department of Livestock the information as outlined above."

After certification, the hogs and poultry from the tested lots would be marketed freely with only routine sampling, which would not require retention of carcasses at slaughtering establishments.

From the producers' and state's point of view, the first phase of certification (swine not fed contaminated feed) went as smoothly as one could expect, considering the vast amount of staff work required and the numerous calls received. As of March 18, the Department has certified 1988 swine producers with an inventory of 228,101 swine. It is noteworthy that, heretofore, the number of swine producers

in Montana was estimated at approximately 1000. In addition, 74 Wyoming and 21 North Dakota swine producers were also certified. As for egg producers who had not fed contaminated feed, the Department certified 22 flocks producing approximately 201,000 eggs/week.

The problems encountered in certifying swine producers who either fed or may have fed contaminated feed is another matter. From the onset, confusion reigned for the state agencies and the producers alike, because of the numerous changes made by FSQS in both sample size and violative levels. For example, the sample size was raised from 5 to 6 hogs within the week. Also, the producer was told initially that contamination of swine would result if an individual animal had 3.0 ppm or more in the fat sample. However, the FSQS staff then developed a statistical model employing a composite sample method for a single producer and then expanded it for two producers. The violative level varied depending on the number of hogs/lot which would afford a 95% probability that one or more hogs would contain levels of 3 ppm or greater. Using the various methods, 46 swine herds with inventories ranging from 2 to 1013 hogs/herd were condemned and ultimately destroyed. The total number of hogs destroyed was 5919 with a mean of 129 hogs/herd. As of February 15, the Department has certified 167 swine producers suspected as feeding contaminated feed with an inventory of 41,033 hogs.

In an attempt to define the impact that the PCB problem had on the swine producer, the Department sent a five-part questionnaire on February 20 to the 167 swine producers who were certified, but were regarded as the "suspect" herds, i.e., they fed feeds which may or may not have contained PCB. This group was surveyed since it was the most severely impacted and the above evidence bore out that their product, for the most part, was free of the residue once the final laboratory results were available. To date, 111 of the 167 responses have been received (with no followup) resulting in a 67% response. In brief, the responses to some of the questions are as follows:

How were you notified of the problem and its progress? 106 responses: 1) Private business (packer, buyer, feed dealer) 35%; 2) State agency 25%; 3) News media 17% 4) Other (word of mouth; county agent; neighbor) 13%; and 5) Federal agency 10%.

How much time was required from sampling until you knew laboratory results from carcass collection? 101 responses: 1) 15-30 days 50%; 2) 7-14 days 35%; 3) Over 30 days (a high of 42 days) 12%; and 4) Less than 7 days 4%.

Did you agree as to how the program was handled? 1) Critical of the program 45%; 2) No comment 45%; and 3) Concur with the program 10%.

General comments mentioned or emphasized were:

1. Too many agencies involved, caused confusion.

2. Unreasonable inconvenience or delay.

3. No good single source of information.

4. Financial loss.

5. Inconsistencies and nonresponsiveness of personnel.

Central to the problem of the "suspect" and condemned herds is the question of quarantine and indemnification. With respect to quarantine authority, the Department of Livestock has the authority to quarantine animals at the farm and at any point in the marketing chain within the state. However, Montana's quarantine authority requires that some solution to the problem must be available for quarantine release. If not, then indemnification of the owner, due to destruction of personal property, is clearly provided for in the statutes. Therefore, the Department did not quarantine any flock or herd involved in the PCB problem since it was impossible for the federal agencies to provide the state with solutions to serve as the basis for release. The uncertainties and indecisions, coupled with the lack of indemnity funds, made it impossible for anyone to properly inform the industry as to what was in store for them.

The USDA, FSQS's critique and description of the Department's involvement with the PCB problem is much different. Recently, Carol Tucker Foreman, Assistant

Secretary for Food and Consumer Services, forwarded FSQS's Report on the PCB Incident in the Western United States to Representative Robert Eckhardt, Chairman of the Subcommittee on Oversight and Investigation, Interstate and Foreign Commerce Committee, House of Representatives. I will cite the sections which deal with these subjects. With respect to the certification program the FSQS staff states on page 64:

> "The gerryrigged certification program appears to have been successful. But before it is used as a model for future contamination incidents, it will be evaluated carefully. The Agency must establish legal authority to assist producers in marketing and also to assist in taking samples on farms. In addition, future certification programs will need to be coordinated carefully with the overall residue sampling program. Finally, certification programs must be designed in a way that does not provide significant loopholes for the marketing of potentially contaminated product."

The FSQS was critical of the Department's position on quarantining suspect herds and apparently the cooperation afforded them as is evidenced on page 66 in the following section:

> "From the federal viewpoint, the states, particularly Montana, often appeared uncooperative during the cleanup. One example is Montana's refusal to invoke its quarantine authority. The Montana Department of Livestock maintained a low profile in dealing with producers with contaminated livestock. State officials apparently did not want to be the bearer of bad news to local producers. As a result, the local producers in Montana came to see the federal government as the cause of destruction of livestock and feed."

The certification and recertification process for commercial operators is still operational in Montana. For some time, the departmental staff has asked how long this will be required since nearly all of the violative feed was either fed or impounded by October 1. The only feed not traced was those lots of less than 1000 lbs, which involved small swine producers who produce hogs for home consumption. Secretary Foreman has provided us the answer in her transmitted letter to Chairman Eckhardt by stating:

> "The epidemiological review of producers and the stepped up PCB monitoring program still continues in the state of Montana and South Dakota. This effort has encountered no major problems, and we expect the final cleanup phase to be completed by July of this year."

Again, the FSQS report transmitted by Secretary Foreman on page 50 cites Montana's position on quarantine as the reason for the long delay:

> "A quarantine could have allowed for a more orderly cleanup process in the State of Montana. State authorities estimated that 300 to 400 Montana hog producers may have used contaminated feed. Because of this widespread contamination, the Agency placed hold and test restrictions on all potentially contaminated meat and poultry when it reached federal plants. The Agency had no control, however, over contaminated livestock remaining on the producer's premises, which could be sold out-of-state at distant markets, could be transferred to another producer's location, or could be sold locally for private consumption. Because the State of Montana refused to impose a quarantine, the Agency is now faced with the long-term problem of having to monitor the location and status of all contaminated herds and flocks that have not been destroyed."

The Department of Livestock stands on its long record of exercising its quarantine authority prudently and only in instances when it is in the best interest of the public. The Department, in its 90 years of existence, has never, nor will it ever, quarantine livestock for arbitrary or capricious reasons. The judicious application of quarantines simply cannot be exercised if the rules are constantly being changed.

In her news release of January 23, 1980, announcing the report on the PCB incident, Secretary Foreman stated that FSQS is taking the action of:

> "Expanded training and education of USDA personnel will emphasize public health and economic consequences of environmental contamination in the food supply."

The expanded training and education involving environmental contamination in the food supply by the USDA must be expanded to include other federal agencies, state agencies, consumers, producers, and finally, the news media. The confusion stemming from the Montana PCB investigation is inexcusable. Any attempt to have anyone in the federal sector to objectively apprise the citizenry of the public health and economic consequence of this problem was either ignored or answered in an aloof vague reference that did little to allay the public's concerns. In contrast, the state agencies collectively prepared at least five news releases which attempted to address these problems and present the current status of the

investigation. Two were presented in a very abbreviated form. The effect was a heyday for the press, who embellished that vagueness to present an overdramatized and sensationalized version of the problem which eroded the consumers' and producers' confidence in the federal government's ability to cope with the problem.

However, of far greater significance was the inability of the federal agencies to assume an assertive leadership role in this episode. This was due in large part to their inability to function and respond in an emergency situation and their reluctance to communicate effectively and openly with each other at the operational field level. One can only assume that this same type of behavior occurred at the regional and headquarter levels because of the indecisiveness of the federal government in reducing the time involved to rid the environment of this problem.

In these types of crises, the federal government, because of the expertise and resources available, is expected to assume the leadership in correcting the problem. The states' role is to serve as a backup to the federal government and serve as advisors to the federal agencies in assuring the most efficient approach to expedite the investigation. In this recent incident, once the federal government had defined the problem, it then had the tendency, based on "lack of jurisdiction," to recede and leave the cleanup process to the state. This incident serves as a good example of how the states perceive federal partnerships -- give me what I want, but don't ask me for anything.

In summary, it is the Department's position that this incident could have been corrected in a much shorter time if the federal agencies involved had an emergency plan available for implementation at the first evidence of PCB residues. The experience gained from this incident clearly demonstrates that long periods of delay result when these problems are addressed in a routine manner. For the most part, the working relationship between federal and state personnel was good.

Therefore, the following recommendations must be considered:

1. The federal government must develop an interagency emergency task force to minimize the impact of chemical contamination of the environment. A finely coordinated and well trained task force comprised of the many specialties required to define and correct the problem must be assembled. Moreover, the task force must be trained to work under emergency situations, not the routine. There is a precedent for this type of operation in the USDA, APHIS Emergency Disease Program. This organization has the background, training and experience to operate under accelerated emergency conditions. The Program is organized to include a staff at the Washington, D.C., level and most important, has regional staffs comprised of federal and state officials throughout the United States.

2. The rosters of the headquarters and regional organizations, giving names, addresses, and telephone numbers of the members, should be widely distributed throughout the states. This would minimize the long times that occurred in this period to a large degree.

3. The role of the IRLG should be known to all concerned. At this time, there are many questions concerning this group. For example, is it the final authority in establishing tolerances? Is it the ultimate staff concerning policy for chemical contamination? How does it function? How is it administered? What federal agencies are represented? Who are the members? Many references have been made to the IRLG, but I know of no state official who has talked to any member. In recent weeks, numerous attempts were made by Montana state officials to obtain a copy of the Cancer Policy drafted and released by the President's Regulatory Council. After many dead ends, we were referred to the IRLG office. Repeated

telephone calls to the office were placed, but no one answers. We were informed that it is a working number assigned to IRLG.

This group should be instrumental in planning for and directing emergency operations. It should coordinate all logistical and jurisdictional problems. It should evaluate and certify all laboratories for all state and federal agencies. The success in preventing and correcting chemical contamination disasters will rest with such an entity like IRLG.

DR. HOWDER: Thank you, Dr. Glosser. That was a very fine report, and I think it should be very useful. When we conclude this, I'll try to explain the IRLG to a few of the people.

Our next speaker is Dr. Arthur Knight. He is the Director of the Montana Department of Health and Environmental Sciences.

DR. KNIGHT: A lot of the things that I had planned to say have been mentioned.

Our PCB incident resulted in hundreds of thousands of laying hens and eggs destroyed after a backup electrical transformer kept at a state meat packing plant was ruptured, and the stored liquid coolant was mixed with 1.9 million pounds of animal feed, later sold by the company. The extent of the problem was revealed when it became known that the toxic PCB-contaminated meal was distributed to 17 states and two foreign countries.

We got our people together from the appropriate bureaus and began a series of examinations of the problems confronting us. The Deputy Director was called in, along with the Food and Consumer Safety Bureau, the Legal Division, Solid Waste Management Bureau, the Chemistry Lab, the epidemiologist, and the Information unit.

To the everlasting credit of the persons involved, the discussions were minutely probing and decisive. We discovered quickly enough the importance of local health departments in responding to toxic substances problems. Working through local health department staffs proved extremely helpful in the areas of sample collections and disposal, as well as providing liaison between the producer and our department in interpretation of the activities related to the problem. By working with the locals, we were able to get a great deal more done in a shorter period of time.

When our PCB storm descended upon us, our problems were, in a sense, unique; problems such as the question of our legal responsibility when involved with a federal agency -- the inevitable coordination with other state and federal agencies -- the lack of approved disposal sites: That is, sites that met the proper criteria for licensing (and even more to the point, we were in need of sites in areas where they were not conveniently available) -- the special problems presented in the slaughter and disposal of live animals as compared to inert materials, such as contaminated animal feed -- the pressures of the press for dissemination of news releases -- the question of what should or should not be released -- as well as who should prepare and distribute the release.

That's not all. There was the business of sample collection and subsequent analysis. The numbers of these samples -- all apparently needed to screen and analyze products -- seemed overwhelming at the outset.

And finally, since each federal and state agency had its own individual program or program series, the development of communications lines became a problem. This was true especially for the producers who became understandably confused as to which agency they were supposed to deal with.

It was obvious that an emergency response system be developed to handle situations such as we have been discussing. We began putting together a response

group, which has already been described.

In the future, we hope to have designated ahead of time an emergency response team composed of a RESPONSE COORDINATOR, an ADMINISTRATOR OF A CERTIFIED LABORATORY, a CHIEF LEGAL OFFICER, and a RESPONSE INFORMATION OFFICER FOR THE STATE. In the event of an incident, the response coordinator for the executive branch of government would be notified immediately; he would determine the expertise needed and the agencies which should be involved. He would acquaint the directors and the Governor's Office concerning his actions, and recommend that a response plan be laid out for the particular incident.

The certified laboratories under the executive branch then must respond to the incident. The lab should review possible certification of other labs in Montana for particular utilization and if, upon review, find it impossible to do so, should conduct workshops to enable that certification. A list of certified labs nationwide should be made available.

The chief legal officer would compile, after consultation with all department attorneys, all laws, rules and regulations available, so that the coordinator has immediate legal direction upon being notified of the incident. Any and all problems arising as a result of this compilation should be addressed by reference to the department involved, the Governor, or the legislature for corrective action.

The response information officer for the state should formulate -- in concert with his peers in the executive branch -- an immediate media response system for the state and should be the only voice to the media during the emergency episode.

Experience may dictate other arrangements for emergency response panels -- or we may find, after the management of several incidents, enough internal flexibility

and ingenuity to manage quite adequately. It is, in its own way, a formal approach, a protocol, and it could become a dependable tool for state health departments. It might also be expected to prepare and maintain accurate logs of the incidents, and subsequent action taken. We should also like to be assured of alert bulletins from the federal agencies involved.

I think there is a need for health officers in all states to become more familiar with this type of problem. In the five years that I have been going to the State and Territorial Health Officers meeting, there has been very little in their meetings that relate to some of these problems. Recently, in a questionnaire from the State and Territorial Health Officers Association, I indicated that there was a need for more programs of this type, such that there could be a review of events like the Michigan experience, which could have been very helpful to health officers in other states and may well have done a lot to prevent this type of thing happening by alerting us more specifically to these problems. There must have been other health officers who made this suggestion, as in our annual meeting this year in Atlanta, beginning the 8th of April, a considerable portion of their whole program is dedicated to these problems.

There is a workshop on toxic agent control. Also, Dr. Reizen, Director of Public Health from the State of Michigan, will be discussing PCBs and PBBs in the Michigan experience. Dr. David Axelrod, Commissioner of Health from New York, will discuss hazardous waste disposal and the Love Canal experience; and Dr. Jacob Fabrikant, M.D., Professor of Radiology and Biophysics, University of California at Berkeley, will talk about public health implications and decision making during nuclear reactor accidents, and the Three Mile Island experience.

If there had been more information on these suggestions five years ago, I think that there may have been a better chance that preventive measures would have been taken to avoid this type of problem. I can certainly admit that I knew nothing about the fact that we even had PCBs in transformers and electrical equipment.

We had a similar problem back in the '50's when cortisone was being prescribed by many physicians to patients with positive TB skin reactions, or also patients who had arrested tuberculosis. This was causing a reactivation of tuberculosis in many patients. After a lengthy and extensive educatioal process with physicians throughout the state, we were finally able to prevent this from happening. However, it took considerable effort on everyone's part to get this message across to the many physicians in the state.

The same kind of preventive educational process is important in problems like the PCB problem. I am certain there will be many other agents just as dangerous that will have to be considered in the future.

Gordon gave part of the pitch that I wanted to talk about, and that was prevention. The transformer stored at Pierce Packing was like a time bomb ticking away. I'm sure that if those people at Pierce Packing had any idea that this transformer would bring the problems that it did, they would have taken proper action immediately. It's great to talk about what we're going to do once we have a problem, but more important, we need to develop strategies on how to prevent this kind of thing from happening. It's just such a horrendous thing, that I hate to think that this thing is going to happen again, but everyone says it will. I really hope that in meetings like this we can dwell on ways to prevent this kind of thing from happening again.

I really hope that out of this whole thing, we can really determine better strategies whereby we can get the message down to the right people on how to prevent problems like this, whether it's PCB or whatever toxic substance we are dealing with. When we have an instance like occurred in Michigan, then the message can be fully disseminated wherever it needs to go, possibly through a rapid information transmission system, so that people know the dangers that exist. In the situation with the cortisone, we had a simple problem with maybe 500 doctors in the state to communicate this type of problem to, and we did a good job of that, and it wasn't long until we didn't see these problems any more.

We didn't see patients coming in with reactivitation because they were on cortisone.

What was said yesterday by Dr. Young about cigarettes and cancer of the lung was very important. Sometimes I think we get things out of perspective, and I don't want to belittle the PCB thing, but every day millions of people smoke cigarettes and inhale smoke with its multiple carcinogens and co-carcinogens down into their lungs and damage their body very significantly. If we could just do something about that and get better strategies to stop people from doing this, I think we could do tremendous things for health in this country, not only as far as cancer of the lung is concerned, but heart disease and many other problems that we see from cigarettes. I feel that problem is far more serious than the PCB problem.

In closing, I would like to say that the people in this state responded extremely well to the PCB problem. I would like to particularly thank Dr. Glosser, of the Department of Livestock; Mr. Gordon McOmber, of the Department of Agriculture; and the staff of the Governor's Office for their excellent cooperation with this program. Thanks also to the federal people who gave us excellent help and guidance.

I would like to particularly commend those in my own department who did such a magnificent job: The Deputy Director, John Bartlett; Vern Sloulin and Cal Campbell, Food & Consumer Safety Bureau; Dr. Skinner, Preventive Health Services Bureau; Duane Robertson and Roger Thorvilson, Solid Waste Bureau; Sandi Muckelston, Legal Division; Ruth Simerly, Public Information Unit; and the State Laboratory people. I feel everyone together did a tremendous job with this difficult and complex problem.

DR. HOWDER: Thank you, Doctor. I think you can see from the discussion of this panel that there are problems that need to be solved. However, I think we can also see that all of these people seem to be looking at the problem in a way that they could bring about better solutions. I want to thank all of you for your participation. We are running a bit late, but we will entertain maybe a few questions, not to exceed five minutes in total time. Any questions?

Q MS. NEWLON: I'm Chris Newlon, and I'm a local sanitarian from Madison County. I've heard a lot from this panel that really sounds good about communication within the federal government and between the federal government and the state government, and within the state government. Has there been any consideration of communication on the local level? I know I was only on the fringes of the PCB incident -- you know, I only got a couple questions that I couldn't answer, and that kind of thing. But I am generally a little bit appalled at how little coordination and communication there is between the local Agriculture people and the local Livestock people and the local Health people. I really think that if we could ever sit down on a regular basis and just even get to know each other, it might really help when a crisis situation developed to have that background and at least know who the other people are. Would any of you care to comment on that?

A DR. KNIGHT: Yes, I would like to comment on that. That's sort of what I was driving at. Like I say, from the State and Territorial Health Officers, I hope we get better communication, better ideas of some of these problems, and I think it's our job then to bring it on down to our department and then also to the local health departments. The local health departments really did a bangup job in this whole problem. A lot of the sanitarians were out and really did a good job all over the state. We do meet with the local health officers, and we meet with them maybe two times a year, and hopefully we can set up some better communications on this particular -- I think we haven't done as good a job as we could do, relating to this particular problem. There, again, I'm talking about the tunnel vision, where you so often just deal with traditional public health problems, and this particular aspect, many of us in public health, lots of times we ignore it and say, "That's EPA," or "That's FDA," or "That's somebody else." And I really think that we, in the department, have got to look at this thing as far as we're concerned to try to better communicate with the local health departments, particularly in this area. I hope somebody is also going to communicate with those other areas that you mentioned.

A DR. GLOSSER: I think your point is well taken, as the theme throughout this seminar has been the vast number of people and organizations and agencies that this impacts. When I was speaking for the state, I was including the state and local, or the local areas particularly, with respect to the investigation that the state was asked to participate in; it was with Mr. Vodneck, on that first meeting and subsequently through, and lines of communication were established. We were all working in our peer responsiveness, or in our specific areas and although I was not intimately involved with the local sanitarians, the reports that I've heard from my people, as far as disposal and so on, the communication was done in a superb manner through Vern Sloulin and Cal Campbell. If there was a problem, as far as the operation of what you did with these animals after they had come, I certainly wasn't aware of it myself.

MS. NEWLON: Thank you.

DR. HOWDER: You know, the problem of communications is probably one of the most difficult things in the world. The mass media can be of great assistance in the transmission of information to the general public. The transmission of information to other people depends upon mostly word of mouth movement of information, so it's really a very difficult thing to get to as many people as can be involved in this, and especially when everybody involved

is under tremendous stress. Are there any other questions? (NO RESPONSE) Okay, if there's nothing else, I think if you'll give me a couple of minutes, I will explain the IRLG group to you. There's been a lot of reference made to it. The IRLG is the Intergovernmental Regulatory Liaison Group. It was organized to bring the major regulators of government together so that they would have a coordinated effort and that one would know what the other's doing and so on. The group consists of OSHA, EPA, CPPS, the FDA, and FSQS. And the groups are organized at the national level, through the agencies and through the regions. And it brings the groups in contact with each other and, hopefully, will cause a better coordination of all the efforts of the government with reference to regulatory operations.

With that, I think I will call the panel closed, and thank all of you for your help.

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EMERGENCY RESPONSE PANEL

I guess I would begin by promising the representative of the Department of Justice that EPA will, in fact, get our RCRA regulations out by April -- I don't know whether I can guarantee April of this year. But seriously, we've been really laboring with those regulations. We have a seven-foot high pile of comments on the proposed regulations and it's been a bit of a problem sorting through all of that to try to come out with a reasonable program. But we have issued the first portion of those regulations. RCRA, incidentally, stands for Resource Conservation and Recovery Act and it will govern a sort of cradle-to-grave approach dealing with hazardous wastes from the generation to the storage to the transport to the ultimate disposal of these wastes. We have issued the first portions of these regulations and seriously, by April of this year, under a court order, we will get the remainder out come hell or high water, I'm assured by our Washington folks.

I'd like to introduce our panel members now. To my immediate right is Alvin Yorke. Al, I didn't get your latest title, but basically you're the Chief of the Emergency Response Branch of the Environmental Protection Agency, Region VIII, in Denver. John Bartlett, on the far right, whom you've met, is the Deputy Director of the Montana Department of Health and Environmental Sciences. And in the middle, Jim Wommack, the Assistant Director of the Washington Department of Agriculture for dairy and food programs. You'll be hearing a little later from each of those folks.

I guess I would start out by explaining the basic premises that I come to this program with, in thinking about it a bit in the past and based on the presentations that have been made earlier in this program. The first premise

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Moderator: Donald P. DuBois, Regional Administrator, U.S. Environmental Protection Agency, Region X, 1200 6th Avenue, Seattle, Washington 98101

that I'm operating on is that public health and environmental threats certainly do occur as a result of toxic material incidents such as the kind that we've heard described in considerable detail here earlier. It's just a simple fact of life that these things do happen. Secondly, they're going to continue to happen on into the foreseeable future.

I might depart a minute there to agree, I think, with Dr. Knight, earlier, that we certainly ought to do every darn thing we can to minimize the frequency and severity of these occurrences through preventive programs, and I'm familiar with some problems of the Environmental Protection Agency through this Resource Conservation and Recovery Act and its pertinent regulations that I've mentioned, through the Toxic Substances Control Act, through other pieces of legislation that EPA is responsible primarily for administering at the federal level but with strong cooperation from the states. The Department of Agriculture has mentioned some new proposals that they have. So I'm sure that, collectively, we're going to start doing a better and better job of preventing these kinds of horror stories occurring in the future. But I think just Murphy's Law -- if you will -- or something, tells me that there are going to be repeated occurrences in the future, no matter how well we do our preventive work, simply because there's so darn much toxic material out there to get tangled up in commerce and food products and in the environment, or whatever it might be.

I guess the third premise that I'm operating from is that there does certainly exist a governmental responsibility to anticipate these toxic incidents and to be prepared to effectively deal with them when they occur. When I say "governmental responsibility," I include all levels of government, and I probably should include the private sector as well. But there certainly exists a societal responsibility to anticipate and be prepared to deal with these problems.

Some problems or questions that occur to me in how, in the context of an emergency, in dealing with these incidents, include the following. The first

may be somewhat simplistic, but I think you've heard enough to maybe make it ring home true to you. I think we need to know better which agencies have which responsibilities, which authorities, which capabilities, to deal with the variety of these kinds of incidents. As I say, it may sound a little bit simplistic, but when you start going down the list and start looking at specific agency responsibilities, they get a little fuzzy at times. They're a little bit overlapping; there may be some gaps in between them. When you compound that with the multi-state problem, in which there is a variety of state organizational structures that differ from even neighboring states, that question becomes a little more difficult to answer than might first appear to be the case. So I think that certainly is a question that we do need to answer if we're going to have an effective emergency response program.

But I think an even more difficult question is really, even if we know who is responsible for what, how do we plan for and deal with actual emergency incidents? And I'm not sure there is even truly an answer to that question, in my own mind. The reason being -- and I think it's a very major problem that we're going to have to grapple with, here -- is that there is almost a limitless number, in my maybe feeble imagination, of possible toxic emergency incidents, if one could envision various scenarios. We've heard of a number of them at this conference, everything from aminotriazole in the cranberries in 1958 or '59, whenever it was, to PCBs in transformers squirting out as the warehouse burned down, to PPBs in cattle feed in Michigan, to PCBs in animal feed in Montana, just on and on and on, and they all have some rather fundamentally different -- either nature of the incident itself, the location, where and how it happened -- and very importantly, I think, different environmental or food or water or product or whatever pathways for getting into commerce or into the environment or into the food chain or whatever. So that we're dealing with a problem that, in terms of trying to plan an emergency response program, that has great bounds,

very wide bounds on it, in terms of all the possible situations that we could dream up. This, of course, complicates how we plan to respond in a way that really is responsive to all of the possibilities here.

So these are our major problems. What I have chosen to do, as an approach here, is to look at some several options, as our panel members will do here. One option that occurred to me, based at least on my experience, and one that I think some of you share, of building, in some manner, on the existing emergency response program that is provided for in the Federal Water Pollution Control Act, the Clean Water Act, for responding to spills of oil and hazardous materials into, basically, the waterways of the United States. I realize that that is a limited circumstance as it might apply to a toxic incidence of one kind or another, but maybe there is a way that we can at least borrow from or build upon this existing program, which has been in business since -- well, full business, at least, since 1972, and some earlier beginnings than that.

I think another at least theoretical possibility would be to create some brand new toxics emergency response structure to do emergency response planning, to coordinate, to communicate, etc., and to respond to actual toxics incidence. It's been suggested that the IRLG might be the foundation of such a new structure, along with bringing the states and local government more fully into that structure. That is a possibility, and maybe we ought to explore that.

A third possibility is really neither of the above. Maybe in recognition that it is impossible to form a structure per se like an emergency response team, either building on the existing hazardous materials response team, or some new response team simply because of the potential breadth of the problem that I mentioned, that maybe a different approach would be really not to have a structured kind of organization to respond, but simply to improve our knowledge of who is responsible for what, to improve our contact capability when something comes up, so that we can quickly jump in and get existing organizations within the federal

government, state government, local government, and so on, to operate to respond to a particular emergency.

Our three speakers -- I think I'll start with Al Yorke, who will discuss the Oil and Hazardous Materials Response Program that's already in place and operating, to just see whether or not that might be a mechanism that we ought to consider expanding toward a broader range of toxic materials. Mr. Bartlett is going to talk about some planning, I think, that has developed here in Montana, maybe most particularly as a result of the PCB incident. And Jim Wommack, from the State of Washington, is going to discuss some plans and programs that the State of Washington has developed. And I don't necessarily think that these are going to be conflicting ideas, but maybe out of those if -- we hope that they will be prompt in their remarks, confining them to ten minutes or so, so that we'll have an opportunity to get your thoughts and get some discussion going following the panel. So, Al, would you like to start off, please?

MR. YORKE: Thank you, Don, and ladies and gentlemen. Since I have only ten minutes, I'm going to dig right into the subject, which is the National Oil and Hazardous Substances Pollution Contingency Plan. The purpose of this plan is to provide a coordinated federal action to prevent the discharge of oil and hazardous substances, to protect the environment from damage when these discharges occur, and to promote federal and state coordination.

To give you a little history of the plan, it was published as an inter-agency agreement in 1968. It was published as part of the Code of Federal Regulations in 1970. It was published in its current format in 1973 as 40 CFR, Part 1510. It was amended in 1975 and again in 1976, and a current revision is ready for publication. Now, I've been told ever since November that this was coming out next week. Every time I call Washington, they say it's coming out next week. That's what I was told last week. So it may be out this week, or it may be

out next week. Don't hold your breath.

The scope of the plan is fairly simple. It's effective for the discharges or threats of discharges to waters of the United States and to natural resources belonging to and exclusively managed by the United States. This primarily talks about wildlife areas, marshes, things like that, that are under the jurisdiction of the Fish and Wildlife Service. The plan, in general, is applicable to all federal agencies. Some of the specifics don't apply to all federal agencies, but some of the prevention requirements and response requirements do apply to all federal agencies.

Although the scope is narrow in terms of legislative mandate under Section 311 applying to waters of the United States, we will use this plan for many different hazardous materials instances outside of the traditional navigable water situations.

I'd like to cover the major provisions of the plan. It assigns responsibilities to the various federal agencies that we have identified as having a role in carrying out prevention and responses to oil or hazardous substances spills. It provides for identification, procurement, maintenance and storage of equipment and supplies. It establishes a national strike force. This national strike force is operated by the U.S. Coast Guard and has three elements: The Pacific, Atlantic, and Gulf teams. The plan provides for interagency notification procedures; for a national response center, which is operated twenty-four hours a day, seven days a week; we also have a regional response center which operates on the same schedule. We have procedures for identifying, containing, dispersing, and removing oil and hazardous substances, for scientific support coordination. The plan provides for the establishment of a national response team and for a regional response team, both of which are operational.

I'd like to cover the major functions of a regional response team. I can break this down to two areas: The planning and preparedness functions; and the

response functions. Under planning and preparedness, the team has the responsibility to review response incidents, to recommend revisions to the national plan -- the current revision to the national plan came out of recommendations from -- a large part of the recommendations from the Region I regional response team, in particular from the State of Massachusetts. To develop the coordination procedures necessary, to review the function of the on-scene coordinator -- I'll talk a little more about the functions of the on-scene coordinator in a few minutes. To meet quarterly to review response actions and consider changes to the regional plan. We have decided, in Region VIII, that we will meet semi-annually rather than quarterly because of the magnitude of our problems versus some that occur back in the Eastern part of the United States.

The national plan encourages the regional response team to conduct an annual training exercise. For coastal areas, annual training exercises are mandatory. For inland areas, they are encouraged on an annual basis. We are planning to hold a training exercise some time around June or July of this year to exercise our current plan.

The response functions of the regional response team are to make agency resources available to the on-scene coordinator as specified in the regional plan. Each agency that's part of the regional response team has a pre-determined responsibility and assignment to handle certain resource requirements in a discharge situation. The regional response team is responsible to provide advice to the on-scene coordinator, particularly in their areas of expertise. To monitor and evaluate on-scene coordinator reports. To immediately call the chairman or any member -- this team can be activated at any time by any member on the team. Typically, it's activated by the chairman, because the chairman usually has the best knowledge of the situation. But if any member wants to activate the team for any purpose, he has that prerogative. The team is automatically activated whenever there's a major or potential major discharge.

In terms of oil, a major discharge is 10,000 gallons of a petroleum product. In terms of a hazardous material, we do not have any quantity limits. We consider the situation and how significant it is, and make a determination of whether it's major or minor. It may be activated by other discharges, if we feel we need the advice or the resources of the team.

Next, I would like to tell you who is on the team, at least from an agency standpoint. (REFERS TO SLIDES) The title of this particular slide is National and Regional Response Teams. I'll try to differentiate between the two. Basically, we've listed all the agencies that are on the team at the national level. There are some exceptions at the regional level. Going down the lefthand column: The Department of Agriculture--they are currently represented by the Forest Service, although often this could be named from the FSQS, if necessary. The Department of Commerce, typically represented by the National Oceanic and Atmospheric Administration. The Department of Defense, Army, Navy, Air Force, Corps of Engineers. We do not have the Navy on the team in Region VIII. We had it for awhile, and couldn't find any use for them, so we dropped them off the team. We have the representatives of the Department of Energy, from the Department of Health, Education and Welfare -- I guess that's changed now; haven't changed the slide on that -- the Food and Drug Administration does represent HEW at both the national and regional level; the Department of Interior; the Department of Justice -- I've said the national response team only. That's probably not true nationwide; but at least they're not on our regional team, but we can access them through the national team, if necessary. The Department of Labor, represented by OSHA. The Department of State, at the national level, and maybe in some of the regions, but not in our regional. We have felt that we do not need them on the team, because there are very few times when we might be involved with Canadian actions. The Department of Transportation, represented by the Coast Guard. The Environmental Protection Agency. The federal emergency management agency. At the regional level, a representative of the governors of each of the six states in the region.

The last thing I'd like to mention is the role of the on-scene coordinator. The on-scene coordinator is the person who is in charge of making sure that a discharge is cleaned up. The first federal official on the scene, under this plan, is the on-scene coordinator until the arrival of a pre-designated on-scene coordinator. The national plan says the EPA will provide on-scene coordinators for inland areas. Therefore, the on-scene coordinators in this region are provided by the Environmental Protection Agency. The coordinator is responsible for coordinating direct federal actions at the scene. In carrying out that responsibility, he collects pertinent facts about discharge, including potential impacts on human health, on welfare, and on natural resources.

We've divided up his actions into five major categories; I've listed four of them. The first is discovery and notification. The other four are evaluation and initiation of action; containment and countermeasures; cleanup, mitigation and disposal; documentation and cost recovery.

And lastly but not leastly, he coordinates very closely with the regional response team.

It's my feeling that this team and the coordination mechanisms that we already have set up could be used, with some modifications or some amendments, to handle various toxics and hazardous substances types of situations, and we would be prepared to start thinking about and developing some plans to do so, if there is agreement that that is the way to proceed.

MR. DuBOIS: Thank you, Al. We'll call on John Bartlett, from Montana, next.

MR. BARTLETT: I believe that all agencies of the various levels of government found a definite need to gain the ability to respond flexibly and effectively to incidents such as the PCB episode. I believe that each agency can look with pride in its given areas, as well as condemn itself in others. I believe the areas of

pride show the use of the peer system, that is, assignment of the various aspects to the professional with the expertise. The areas of condemnation and regret, I think, are found in the lack of awareness, priority setting, and advanced planning. This seminar, I hope, will center on the answers to the areas of mistakes, while retaining in that answer the areas of success.

My own review has brought me to the belief that the "Boss" concept needs full development to bring assurance that next time, we will be ready.

I support all efforts in the various agencies to feel secure on their "end of the stick." But I am certain the need exists to move beyond that necessary action. I suggest that move be made by the governors of the various states, the premiers in Canada, and the President of the United States, to name an individual with full authority to cross agency lines, assign duties with the understanding that the assignees are agents of that individual and he has the power to set priorities. That individual will inventory resources, legal authority and responsibility of the various agencies. The information thus assembled will be disseminated to all agencies to make them aware of each other, to make coordination possible via the "Boss" and eliminate confusion through awareness.

The decision makers will appoint by name the following area people to work under the "Boss" coordinator. First, a media person who will develop educational tools, control spokesmen during the episode, keep contact and communication at all levels of the agencies. Secondly, a legal counsel that will research the various responsibilities and authorities and be a focal point for all legal questions that arise, as well as the "turfdom" issues. Thirdly, a laboratorian to inventory and review certification possibilities to utilize all possible lab resources.

This team of four from the states, the region, and the national, will become known to each other and jointly do advance planning by interchanging of existing facts gathered from their responsibilities. They would hold workshops for themselves, and then seminars like this one today for all agencies for awareness

purposes. They would determine possible assignees, review tolerance levels, and determine for all agencies, at incident time, those levels. They would set reporting form for the various agencies to transpose from their agency's given form, and oversee consistent dissemination of the information.

I believe proof is in the pudding. The three state agencies of Montana made this work, via John Vodneck, of FDA, and subsequently, with Roy Bjornson, of the State Department of Agriculture. This proven concept does not infringe on each agency's response plan, but rather it supplants it when several agencies must be involved, utilizing agency response mechanism for given assignments, and a coordinator with authority to receive and disseminate reports, so all will know who is doing what.

I hope the decision makers present here will view this with favor, and as you heard this morning, the Montana Governor does and will, and we move now, before another incident, and have it implemented and assure the citizenry we have a workable team in place.

MR. DuBOIS: Thank you, John. Jim Wommack, from the State of Washington, is next.

MR. WOMMACK: Thank you, Don. I am very happy to get over to Montana again, the country that is close to the country that I was raised in. I see we've talked a lot of about communication, and even some people in my organization sometimes complain of the mushroom syndrome. I think you all know what that is. Especially in the remote areas of our states. That's when you're fed horse manure and kept in the dark. And they do mention that to me at times, when we have lack of communication in my own organization.

So I think it is very important that we do communicate, and the topic of discussion today on this panel involves hazardous material, its transportation,

and the manufacturing of other products, and product preparation and processing plants, and several incidents of this nature in our complex society. The Governor of the State of Washington, realizing the need for addressing these potential hazards, wrote an Executive Order on the 29th of September of 1978. I'd like to read this Executive Order to you, as it addressed the complex problems in the major nature of the topic that we're discussing on this panel today.

"WHEREAS this Administration recognizes the need for a coordinated response program and designated response team trained and equipped for dealing with spills, accidents, and incidents involving hazardous materials and wastes in the state, and

WHEREAS no single agency or industry is capable of handling the problem alone at this time, and there is no existing coordinated system among the agencies assigned responsibilities in the area of hazardous materials, and

WHEREAS the State of Washington has the responsibility to provide leadership in this area, and

WHEREAS the scope of this responsibility includes incidents arising from raw product preparation, manufacturing, processing, merchandising, transportation, storage, use, and disposal of such chemicals and related materials, and

WHEREAS the authority to establish a coordinated response system is inherent in my office as Chief Executive of the State of Washington,

NOW THEREFORE, I, Dixie Lee Ray, Governor of the State of Washington, do hereby order and direct:

A. That the Washington State Hazardous Materials Committee be established as a response team with the authority and the responsibility to develop, implement and administer a program which will incorporate all present teams, agencies, and systems into one response unit.

B. That the Interagency Memorandum of Understanding, duly signed by the heads of the Departments of Agriculture, Ecology, Emergency Services, Fisheries, Game, General Administration, Labor and Industry, Military, Natural Resources, Social and Health Services, Transportation, the Utilities and Transportation Commission, and the Washington State Patrol, be the instrument of implementation. The Memorandum of Understanding is hereby attached to and made a part of this Executive Order.

C. That the above-named agencies affected by or having expertise in responding to hazardous materials incidents, join in the coordinated

plan of action as set forth, subscribed, and agreed to in the Memorandum of Understanding attached hereto.

That in the event of a hazardous materials incident that has the potential for affecting human lives, animal life, the environment, or property, the response plan will proceed in immediate effect.

That the Hazardous Materials Committee direct operations as set forth in the attached Memorandum of Understanding, receive communications, assess the conditions, compile and critique the data and reports, and transmit the recommendations to affected agencies for immediate response to emergency conditions resulting from a hazardous materials incident, and engage in followup activities for the prevention of future incidents."

Now, I'd like to go over some of the highlights in the Memorandum of Understanding that was signed by the various agencies. The Memorandum of Understanding for the Washington State Hazardous Materials Committee has the following purpose. Agencies whose directors are signatories to this Memorandum of Understanding comprise the initial membership of the Washington State Hazardous Materials Committee. Representation was invited from the legislature, local government, federal government, environmental groups, and business.

The Committee has the responsibility to plan for the prevention of and to provide for coordination and control and support of hazardous materials incidents in the State of Washington. The goal of the Committee is to develop a cost-effective program for the prevention of and the emergency response to hazardous materials incidents. To achieve this goal, the following specific objectives are established:

1. To identify, analyze, and develop, consistent with existing resources, specific mechanisms for the prevention of hazardous materials incidents.

2. Plan for more effective, coordinated responses to hazardous materials incidents, utilizing the resources of local, state, and federal agencies.

3. Respond to hazardous materials incidents in a manner that will minimize injury, loss of life, and damage to property, to the environment --

And statutory responsibilities -- develop available resources in existing areas of expertise in each agency to accomplish these objectives.

The management -- the scope of the Hazardous Materials Committee's management responsibilities ranges from the prevention of hazardous materials incidents

to training persons in techniques for responding to such incidents. The management and support responsibilities of each participating agency reflects existing statutory responsibilities and capabilities.

The coordinating agency assigned to develop a master plan for the prevention of and reaction to hazardous materials incidents shall maintain a 24-hour response capability and communications links with other participating agencies. The primary response agency, with a 24-hour response capability in law enforcement authority, designated as first-on-the-scene support at the incident site to provide site control and initiate communications with the coordinating and secondary response agencies.

The secondary response agency shall make its technical and/or service capabilities available at the request of the coordinating agency. The support agency shall use its manpower and equipment resources to serve at the request of the coordinating and/or response agencies.

Participating agencies shall urge private industry to participate in the mitigation of hazardous materials incidents when it is exposed, involved, responsible, or has services and facilities uniquely located or available to provide services.

Training is an essential part of the administration of the program. The coordinating agency shall develop a master training program and other participating agencies shall implement additional training programs as appropriate.

Communication is also an essential element of the program. The first reports of major hazardous materials incidents shall be communicated as soon as possible to the coordinating agency, which shall establish and maintain direct communication with response and support agencies, local agencies, private industry, the legislature, and the government.

Coordination and planning -- the Department of Emergency Services is designated as the coordinating agency for the State's response to hazardous materials

incidents. In addition, Emergency Services will coordinate the development of the Washington State Hazardous Materials Emergency Response Plan and provide training and program direction.

Primary response -- the Washington State Patrol is designated as the primary response agency, and charged with providing immediate control in the event of an incident, and serving as a communications link between the scene of the incident and the coordinating agency.

Technical response -- the Departments of Agriculture, Ecology, Labor and Industry, and Social and Health Services are designated as technical response agencies and shall respond to instructions and requests for assistance from the coordinating and primary response agencies. Collectively, these agencies shall assume control of the technical aspects of the State's role in handling incidents.

And those agencies in support will be the Departments of Fisheries, Game, General Administration, Natural Resources, Transportation, and the Utilities and Transportation Commission, are designated as support agencies. These agencies provide manpower, equipment, and technical support as recommended by the technical response agencies.

Now this program is ongoing and viable. The Committee meets once each two months in response to -- we had three minor incidents in 1979, involving the pesticide, parathion. The industry people responded to the particular incidents. We lost a barrel off a truck some place between Moses Lake and Vantage. It was discovered; it wasn't broken; it didn't leak into the environment. There was another instance in the Colfax area, where part of the hazardous material leaked onto the wheels of the vehicle. It was cleaned up properly by the industry response team, with no further complication.

I think that's all I can say at this time.

MR. DuBOIS: Thanks, folks. I'd like to maybe try to put this together, here, if I can. Al Yorke described the Oil and Hazardous Materials Program, and mentioned that there are state representatives on the response team --

Q MR. DuBOIS: -- and I would just like to ask Al if those state members tend to be the "boss-man," as John Bartlett described in his proposal, or as Jim mentioned, as the head of the broad emergency response -- is that the kind of person that is on the regional response team, representing the State, or does it tend to be, say, a water pollution control expert within the State agency?

A MR. YORKE: Generally, it's a water pollution control representative within the state agency, and that will vary from state to state as to what level of designee they have. We have letters from the governors of each of the six states naming these representatives.

Q MR. DuBOIS: So maybe that would indicate, if we were to follow the Oil and Hazardous Materials response pattern, at least, or program, there might need to be some change in the kind of state representatives as well as maybe some of the federal representatives on the emergency response group.

A MR. YORKE: Let me comment on that just a minute. I have tried to stress to each of the states that the person that sits on this team represents the governor and, therefore, all the state agencies. And I have asked them to review that designation if they feel it is not appropriate. Now, in the federal level, we have designated representatives from each of the agencies that I covered as alternates. We can have one or more alternates. These alternates might vary. For example, in the Department of Agriculture, we currently have the Forest Service as the primary representative. An alternate or alternates could be named from FSQS or some other agency as appropriate to handle a certain situation.

Q MR. DuBOIS: John, it wasn't quite clear to me whether you had, in Montana, set up what I have written down as the "boss system." Do you have such a system in place along the lines that Jim mentioned, that has been sort of written down and agreed to in the State of Washington?

A MR. BARTLETT: Yes, we have the same type system that Jim spoke to, and I have no objection to either of what's presently in place. What I am suggesting is beyond that. It has to be just one guy within that state, within the region, within the nation, that is full time, putting this thing together. In regard to what Jim had to say, we have a person in the Department of Health, Larry Lloyd, that's called 90 percent of the time by the Highway Patrol and the Civil Defense people, who are the coordinators in this state. It works well. But those are spills, are localized, and so forth. When you get into this widespread thing, such as PCB, we needed John Vodneck up here to make us agents and to tell us, "Okay, Health, you go do this, this; Ag, you do this; and Livestock, you do that." I'm advocating that that's necessary when this type of widespread thing happens. Again, as I say, I think where we fail is in advanced planning, in the priority setting, and in the awareness of each other. If we had this one person, and all of them talked in a peer system, I think we can solve a great deal of problems that do exist. So I would build on what presently exists. And I advocate -- like

USDA has set up plans since then. I think each agency should, and at their end of the stick, be fully protected. But I am confident in my own mind, when you run into the various agencies and the turfdom and the legal question and so forth, somebody has to be able to come in and say, "This is the way it is," and go with it.

Q MR. DuBOIS: Does it make sense to you, John, that your "boss man" could be the Montana representative on the Al Yorke type of emergency response program, and use that vehicle, expand it by the programs that you would develop in Montana and respond to a broader variety of emergency than is currently covered by the Oil and Hazardous Materials Emergency Response?

A MR. BARTLETT: Yes, that's very possible. My only reservation at all, I think, this one "boss man" -- that's going to be his full duty; where, I think, in this instance, in the water arena, my man has far more to do than just that particular phase.

MR. YORKE: There's a couple of things that I didn't have time to mention in the presentation that have come up during the session several times. One is, the role of the on-scene coordinator is very definite, and it's done by intention, and the regulations establish a national contingency plan, that the on-scene coordinator is the person in charge. He's the "boss man" from the federal level, to make it work, to make sure that all the coordination is done and is happening. One of the things that the RRT can be used, is in settling disputes, in turf battles. And that's another basic coordinating mechanism. I have a copy of our regional plan, here, and I might run over just a couple of items that are included in here, because there are some things that people have been asking for that they say ought to be included, and I think we already have them included here. For example, we have notification, communication, and reporting procedures. We have public information procedures. We've provided for the establishment of a news office. We know which agency is going to provide the news coverage and how it's going to be done. We've listed the legal authorities of the agencies that are involved in this plan. We've listed the funding down to the state level, and what kind of funds are available to carry out the plan. We have identified cleanup techniques to be used, and we have a public assistance directory that provides names and addresses, telephone numbers, for state-level agencies and district-level agencies. In the original response center, I have the names and addresses and telephone numbers for every county health officer in this region, for every sheriff's office in this region, and for every county Civil Defense director in the region, plus additional information. That's the type of detail we've gone to in establishing -- knowing who people are and how to get hold of them.

Q MR. DuBOIS: I might ask Jim Wommack for a little bit of amplification on a couple of points. It wasn't clear to me -- you mentioned, in the State of Washington program, that you would develop emergency response plans, training programs, communication plans, and so on. Have those been developed yet, or are they under development, or where does that stand?

A MR. WOMMACK: Yes, Don, they are. They have been developed and I have a copy of one with me. In fact, we're in the third stage, draft three of the recovery plan and the organization and techniques. Some of the training has been done -- most of the training has been done. The coordinated efforts are shown by lists of the local health departments, health authorities, and the industry people to call when there's questions as to the proper disposal of

some hazardous material that has been spilled. And so we do have a plan and it has been developed.

Q MR. DuBOIS: Did your state plan take over with respect to the PCB incident that occurred here this last summer and fall, or was it handled by some other means in terms of the contamination that ended up in the turkeys and chickens and so on in Washington State?

A MR. WOMMACK: Actually, the coordinator happened to be me. We have emergencies every day in my shop, it seems sometimes. In fact, our business is sometimes alluded to be -- our business comes like bananas: In bunches. So being in the food area, and the contamination being in the food area, and the statutory authority and responsibility laying in my particular division, because we do regulate eggs, all food products, milk, dairy products, etc., I happen to be the coordinator and work directly with the USDA people, the Food and Drug Administration, and so forth. The NRSTEN system -- that unit is located in my office. Communication was excellent. At the outset, the Food and Drug Administration contacted us. Dr. John Howder's office was also in Olympia and it was only about two blocks away, so we did have communications with him, and coordinated our efforts to the point where we feel very strongly that there wasn't any contaminated product that reached the final consumer in the State of Washington. Our news releases supported that contention.

Q MR. DuBOIS: Did your program bring in other Washington State agencies, the Department of Ecology or Health or Social Services or whatever, or was the nature of the thing such that it was within the bounds completely of the Department of Agriculture's responsibilities?

A MR. WOMMACK: The PCB incident was pretty well related directly to the Department of Agriculture's statutory responsibilities, because our statutory authority lays within the Uniform Food, Drug, and Cosmetic Act, and pretty well encompasses all processed foods in the State of Washington. The state and local health departments addressed the food service establishment operations.

MR. DuBOIS: Okay. Well, I think we've heard of three somewhat similar proposals, but a little bit different. They certainly, to me, all have some common elements of a pre-planned method of communicating with each other, some inter-agency agreements as to who does what, and sort of a "boss" in one context or another. And I think that I've heard three people from three different agencies recommend that general approach. I guess I'd like to hear from anybody in the audience that either agrees or disagrees or has some different thoughts about the kind of approach that I think was fairly similar that was presented by each of the three panel members. Does anyone have any thoughts to build on what has already been said?

Q MR. PEABODY: I'm Jack Peabody, with Chem Nuclear Systems. I would like to get some clarification, if I could, on these response teams. It appears that the response team is going to be in charge of the actual cleanup. They're a very active type of operation. That's kind of the implication I was left. I'm curious. If it is a very active group, you would therefore take liability for the actual cleanup, or are you more of an advisory group to help

the industry or -- let's take an example, say, an on-plant spill. Do you help assist in the industry cleanup by advisory action, or do you actually step in and do the cleanup and take liability for the actual operation?

A MR. DuBOIS: Well, I can speak for the way that -- maybe Al can amplify further on this -- the way Oil and Hazardous Materials Program works, is that, if there is a spill or any incident, the on-scene commander -- generally for inland water, being the Environmental Protection Agency -- will come in. The spiller, or the responsible party, is given first opportunity to clean up that spill, prevent or minimize damage to the environment, and so forth, with assistance and cooperation from EPA, up to the point that we become convinced that the spiller, either by his own admission or our own determination, is not properly responding, in which case we can then step in and take over the responsibility for directing the correction of that problem. Is that a fair summary, Al?

A MR. YORKE: That's right. And if it's in the waters of the United States, we take over the funding of it, also.

Q MR. DuBOIS: It sounds to me, John, in your proposal, that maybe a similar kind of thing -- or maybe Jim, too -- could apply in other incidents, not the oil and hazardous materials spills, but that somebody with responsibility is there to see to it that the problem is corrected, and that the first opportunity presumably would be given to the party responsible for causing the problem, but if that response is not adequate, then it would be some state, federal, or whatever, direction assumed at that point. Is that right or wrong, under your proposals?

A MR. BARTLETT: That's correct.

Q MR. PEABODY: It would be fair to assume, then, if there is a disagreement, and the federal agency or state agency took over, they would then take all the liability for their actions?

A MR. DuBOIS: I don't think I would presume that. I don't know, but I think we'd have to talk considerably more about that. We've talked about indemnification and all that at this conference. Each federal and state agency has certain responsibilities, federal and states laws that we administer, and I don't think that, in administering those laws, that we'd, as a result, assume all responsibility and all liability for anything that goes wrong. I think that that basically, as we heard this morning, rests with the party that created the problem in the first place, and we're talking about programs, projects, that correct that problem. Now, if there's something that an agency does that, by their own responsibility, causes a further problem, that might be another issue. But I don't think we assume liability for the whole problem by moving in.

MR. HEALTON: I might just mention a very recent incident in which we had a problem in northern Virginia. A kerosene transportation line broke underground, and in fact, threatened the water supplies of Fredericksburg and the Occoquan Reservoir in northern Virginia. The immediate response, there, was that the federal government did, in fact, step in and direct specifically the cleanup action, without waiting for any question to be asked as to whether or not the firm that owned the pipeline would or could attempt a cleanup. The cleanup was done first and the questions were going to be asked afterwards. The main thing that happened there was that a

quick mobilization of the federal resource -- in fact, everybody that could handle straw got out and tried to clean up the mess before it affected the water supply. It was a very good opportunity and, as a matter of fact, finally determined that there was some 250 to 300,000 gallons kerosene that had gotten loose and had to be cleaned up.

MR. DuBOIS: Thank you. We're already running beyond our scheduled lunch hour time, here, and I don't know how much further we can pursue this. One thing I would really like to come away with before I leave town this afternoon is some kind of an agreement that somebody is going to follow up on this issue and start carrying it beyond the kind of discussion, philosophical phase where we've left it, if that's in fact where we've left it. I would volunteer the representative of my region responsible -- counterpart to Al Yorke, to join with any appropriate body that is put together to try to pursue this further. I think we have -- to me, it sounds like, and I haven't heard a negative reaction from the audience -- enough to kind of get going here. We know enough about what it is we want to do and need to do to pursue it to some further level of sophistication, and I would volunteer Jim Willmann, of my staff to do that, and the resources of my regional office to assist Jim to help him do that.

And if I could recommend to whoever is receiving recommendations at this conference, that the two representatives of the EPA regional offices in Regions VIII and X, and as many state representatives as is desired and appropriate as far as the states are concerned, to meet within a month to pursue this further and see if we can start getting something done on paper, at least in terms of names of people to call, the bosses in each state or the bosses in each regional office, or whatever, to try to pursue this further. I think I can also represent the IRLG in Region X to say that, through me or whomever you wish to contact, I'm sure we'd be willing to pursue this further as well. Does anybody disagree with that. (NO RESPONSE) If not, we'll adjourn.

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OPERATION OF A HAZARDOUS WASTE DISPOSAL FACILITY

Abstract

Chem-Nuclear Systems, Inc. owns and operates a regional chemical and hazardous waste treatment and disposal operation. This Pollution Control Center is located near the small town of Arlington, Oregon and is licensed by the State of Oregon and U.S. Environmental Protection Agency.

The purpose of this paper is to discuss the physical characteristics, operations, and support services of an optimal site and how they apply to the Arlington Pollution Control Center.

Physical characteristics such as climate, hydrology and geology will be considered. On-site operations for treatment and disposal, as they apply to different waste types, will also be discussed.

Finally, due to the region's need for chemical spill clean-up, abandoned site restoration, repackaging for transport, and a transport collection system, and off-site support services provided by the facility will be mentioned.

Text

Chem-Nuclear Systems, Inc. (CNSI), a Washington based corporation, is most widely known in the low-level radioactive waste field. At present we are the largest transporters and disposers of low-level radioactive wastes in North America. We are also about the largest in the low-level radioactive support fields with such on-going projects as the clean-up of the Three-Mile Island nuclear power generation facility.

In the chemical and hazardous waste field, the Arlington Pollution Control Center serves the vast region of Northwestern North America and the Pacific.

Presented by Jack Peabody, Office Manager, Chem-Nuclear Systems Corporation, Box 1269, Portland, Oregon 97207

A vast cross section of chemical wastes are generated in the region and handled by the center. These chemicals fall into many easily recognizable categories such as poisons, corrosives and flammables. There are also some categories which are not so easily recognizable, such as carcinogens, bioaccumulative, or reactive wastes. There are some wastes, however, that we do not handle at the Arlington facility: radioactive materials, commercial explosives, and poisonous gases.

What physical characteristics make up the optimal site? Basically they fall into two categories: naturally occurring and mad-made. The naturally occurring factors are climate, hydrology (surface and sub-surface water), and geology. Man-made characteristics center around overcoming naturally occurring deficiencies and monitoring for chemical escape into the environment.

Looking at the naturally occurring characteristics of the CNSI Pollution Control Center it should be noted that the facility is located on the high mid-central Oregon Columbia Plateau about 15 miles from the little town of Arlington. The climate is such that the average annual rainfall of 9 inches is overshadowed by the 63 inches of pan evaporation. This leaves the area moisture deficient.

They hydrology of the site is excellent. Being on a high plateau, surface water and flooding is not a factor. Sub-surface water is over 500 feet below the site and sealed from surface activities by geologic formations.

The surface soils are gravels eliminating the problem of blowing dust. The unsaturated soils immediately under the site act like a large sponge, sopping up and holding fluids. The immediate subsurface soil is tight tuffs which do not allow water to migrate over one foot in 10,000 years. Below the 200 feet of tuffs is an impervious basalt rock formation which extends down in excess of 3,000 feet. This geology is even more impressive in that there is no known potential for geologic hazards such as lava flows, landslides, faulting or earthquakes. These factors all help insure that there will be no escape of the chemical wastes from the disposal area.

There are man-made characteristics to further insure against the escape of the chemicals from their repository including engineered barriers and environmental monitoring above and below the wastes. Subsurface monitoring is usually done using lysimeters. The lysimeter is a device which captures sub-surface fluids allowing surface gathering of samples for laboratory analysis. These units are buried in grid patterns at several depths under and near all operations. Air monitoring is also used during active operations involving chemicals which could be a hazard if volatilized, such as mercury or fluorides.

CNSI Pollution Control Center separates on-site operations into five major categories: treatment, disposal, processing, PCB handling and reclamation. Treatment primarily involves solar evaporation and chemical neutralization techniques. Disposal includes both secure landfilling and landfarming.

Processing comprises chemical detoxification and encapsulation methods. PCB handling deals with our PCB liquid storage facilities and PCB transformer break-down operation. The final operation is reclamation, which deals with recycling chemicals and reclamation storage systems.

Solar evaporation is used for inorganic wastes which are highly aqueous (over 80% water). All of the solar evaporation ponds have reinforced plastic liners which are soil covered for the protection. Also, lysimeters are placed under the ponds to monitor for liner degradation. The solar evaporation process is rather simple. Wastes of similar characteristics (i.e., acids and bases) are placed in each pond. The sun's energy is used to evaporate out the water, thereby concentrating the chemicals. Periodically the concentrated chemicals are removed and neutralized for disposal.

Sludge handling methods are used for neutralized inorganic sludges which are less than 80% water. These sludges are put in asphalt-lined trenches. Each trench has a French drain containing a lysimeter which is under the liner

for monitoring. The water in the sludge is solar evaporated out with the neutralized chemical residual entombed.

Secure landfilling is primarily used for containerized chemicals and dry bulk wastes like contaminated soil. Again, lysimeter monitoring is used. The containers are stacked in lifts and immediately backfilled with absorbent media. As per our EPA license, PCB solids are segregated in a special area where they are charcoal encapsulated prior to covering.

Liquid PCB handling and the breakdown of PCB transformers are also carried out at the facility. This work is done inside the controlled environment of an EPA approved building. PCB transformers are generally shipped to us intact for safety in shipping and breakdown in a more controlled environment. The liquid PCB is removed and drummed. An EPA approved flushing material is added and allowed to soak. Then it is drained and drummed. The drummed liquids are then housed in another building for eventual incineration at an approved EPA facility when one becomes available. The transformer bodies are then disposed of in the EPA approved secure landfill.

Landfarming, sometimes known as biodegradation, is used to destroy heavy organics such as heavy oils or petroleum refinery bottoms. The organic compounds are blended into an appetizing mixture for soil bacteria. The soup is topically applied to land and filled into the top 8 inches of soil. Here special strains of bacteria and other soil microbes biodegrade the wastes into simple chemicals like carbon dioxide and water.

Encapsulation or solidification is a technique used widely in the radioactive waste handling industry. It has applicability in the chemical waste industry for highly toxic wastes where other forms of treatment are impractical or transport of liquids involves high risk. Containerized or bulk hazardous wastes are processed by mixing them with solidifying chemicals trapping the wastes in a solid matrix.

A major focus of CNSI is to recycle and reclaim usable materials. We reclaim as many waste systems as possible. Other chemical wastes are reclaimed almost exclusively for our neutralization, detoxification and stabilization processes. Some wastes are stored in segregated areas for eventual reclamation. A case in point is our pot liner trench. Here, spent cathode liners from aluminum reduction pots are stored for possible recovery of the chemical cryolite. Since the pot liner is laced with leachable amounts of cyanide, conventional storage at the aluminum reduction mills is not practical. The waste is therefore sent to us whereby it is stored in a segregated area for eventual reclamation upon the development of an economical recovery process.

Due to our on-site experience in dealing with hazardous chemical wastes, CNSI has developed off-site operations to better serve our region.

Such operations as chemical spill clean-up, abandoned site restoration, repackaging, and transportation systems to handle chemical wastes have become available. We have found these are necessary functions of a chemical waste treatment operation. These functions protect the public by demonstrating the facility's commitment and capability in handling hazardous chemicals.

The activities of chemical spill clean-up, repackaging, and site restoration are somewhat similar. The problem is to get the chemicals from their precarious environmental situation into a transportable form (in most cases) and off for treatment and/or disposal. Since similar problems are encountered daily by on-site personnel, CNSI felt that they should provide these services to the public.

Transporation is the life blood of any stationary facility. It is a cost that in many cases exceeds the treatment or disposal. It is also a potential liability that can be quite large and troublesome. Therefore, we believe the Pollution Control Facility should provide assistance in this area. To help protect the public and help minimize the potential liability, we implemented

HAZARDOUS WASTE DISPOSAL PANEL

Thank you, Vern. I'd like to introduce the panel members on the hazardous waste disposal panel. At my far left is Jon Yeagley; he's with EPA in Denver, Air and Hazardous Materials Division. Kent Gray, who's with the Utah Division of Health. Jack Peabody, who you all know by now from his excellent presentation at lunch. And Rich Reiter, from the Oregon Bureau of Environmental Quality.

I first of all want to express my appreciation for the opportunity to participate in a meeting of this type. I've worked in Washington for a long time before coming to Denver four years ago, and I know the types of debates that take place in the Congress and even in state legislatures to some degree, but particularly with the federal agencies in Washington -- EPA is kind of a classic example. You know, we write regulations back there, and there's very little first-hand knowledge of the real world. It's done in a vacuum, to some degree, and even the public hearing process and comment process that the agencies go through really does not begin to bring together an effort to focus on the problems in the field. I think it takes symposiums and meetings of this type, where you get a first-hand feel for the problem and you take all the regulations and the various mechanisms that are put together to handle a problem like hazardous waste. They all come together at this level. And the people that have to deal with these problems on a day-to-day basis in a real-world situation are the ones that are really going to make the whole system work and get this nation's act together in terms of dealing with hazardous wastes. So I appreciate this opportunity and I appreciate the opportunity to have the EPA participate as much as we are participating in it.

I think for the two days, we've heard a lot about the health impacts of hazardous wastes and gotten some case studies and first-hand knowledge on some

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Moderator: Roger Williams, Regional Administrator, U.S. Environmental Protection Agency, Region VIII, Suite 103, 1860 Lincoln St., Denver, CO 80203

very serious situations in the country and we've gotten a little feel for the emergency response to these problems. But I think when all the dust clears, it's really the residual of all those activities that we're really faced with. It's probably the most difficult part of the task, and that is taking the residual, contaminated materials of a hazardous waste and coming up with a suitable disposal site or a treatment process that's going to put the problem to bed. I think that this is also the most difficult, the most complex, and it's probably the most controversial part of the total hazardous waste equation.

At present, about 90 percent of all the hazardous wastes that we generate in this country each year -- which is roughly 50 million tons -- is not being disposed of in what EPA has described of as an environmentally sound manner. A lot of it goes to the dunes, impoundments, landfills. Some of it is incinerated with improper controls, monitoring. Some of it goes out to the North 40. Some of it is dumped into the sewer systems of our cities. And a lot of it is a product of midnight numbers. But very little -- only ten percent -- is really going to good, adequately controlled disposal sites, such as we saw described at lunch.

Estimates indicate that there are about 32,000 sites nationwide which contain or are presently receiving hazardous wastes. As federal and state programs take shape, accountability and liability will drastically reduce the number of sites to those that will meet modern disposal requirements and obtain appropriate site permit. When the RCRA program goes into effect this fall, many states and large regions of our country will be without adequate sites. At present, as we all know, there are only a few throughout the ten-state Rocky Mountain region.

The Montana PCB contamination problems underlines the need that all states must be able to deal with hazardous wastes generated within their own boundaries.

Low level PCBs were allowed to be disposed of locally here in Montana. But by and large, of the higher level waste, the majority of the material had to be shipped out of the state to Idaho and, in the case of the transformer, to Oregon.

In almost every one of the Rocky Mountain States, we are holding hazardous wastes in storage in anticipation of an acceptable and convenient method of disposing of it becoming available. We all know the problem we have with PCBs and the fact that there are no approved incinerators in this country at the present time.

Final regulations for the disposal of hazardous wastes under RCRA will be published by the end of next month, as Don Du Bois indicated earlier. We hope. We've got our fingers crossed. The regulations will become effective roughly six months after they're published, or some time this fall. For the first time in the United States, a nationwide program to assure control over the disposal of hazardous waste will exist. Although technical criteria on the regulatory program for hazardous waste disposal facilities will not be published until the fall of 1980 and will not become effective until May, 1981, during this interim period -- which is roughly six months between November and May -- issuance of a permit to each facility disposing of hazardous wastes must comply with minimum standards.

What this means is that in about eight months, anyone wishing to dispose of wastes which meets the criteria for hazardous waste must do so in a manner prescribed by law.

One of the key elements in insuring proper disposal is that facilities for disposal should be readily accessible. Congress placed the burden of proper disposal of wastes directly on industry. Except for Idaho and Oregon, there are no sites close to potential users in this region. The cost of transportation

has contributed in the past to improper disposal. Now that many of the old standby municipal landfills, and so forth, will no longer be available, we may see an increase in the amount of hazardous waste people try to get rid of in any fashion while they still can.

In the near future, hazardous waste sites must be planned by industry and possibly by local and state governments to properly take care of the hazardous wastes generated within their own areas. This will not be easy. The controversy of finding an acceptable hazardous waste disposal site is second only to the controversy surrounding nuclear waste disposal. No one wants a hazardous waste disposal site in their back yard.

The purpose of this panel is really to discuss the issues surrounding hazardous waste disposal, some of the problems that we will encounter and, hopefully, recommend some solutions related to establishing acceptable hazardous waste disposal facilities in the Northwest. The way we've organized the panel is to focus on what we believe are the four critical areas that we think that you need to be aware of and that we need to share together in some discussion to begin to approach the problem.

I'd like to start out with Jon Yeagley talking a little bit about the impact of the Resource Conservation and Recovery Act and the hazardous waste regulations on the siting issue. So Jon, could you lead off?

MR. YEAGLEY: For those of you that may not be all that familiar with the Resource Conservation and Recovery Act, I think you've heard the terms, "cradle to grave," at one time or another as we've gone along, here. Basically, the intention of the act is the regulate the hazardous waste industry from the point of generation of waste through transportation to storage, treatment and disposal.

You've heard a lot about the schedules for development of the regulations. Those that Roger has given you hopefully we'll be able to stick with. Obviously, we've made several delays as an agency up until now. I'd like to give you just a couple of other dates, however, that relate to the implementation program, assuming the development dates hold. Primarily, I'm keying to the April, 1980, date for the issuance of the definitional criteria for hazardous waste.

The major key in the hazardous waste program is the fact that we can authorize states to run their program in lieu of the federal government running that program. The implementation of interimly authorized states will take effect at the point of the effective date of the regulations, or October, 1980. Interim authorization can run approximately two years, and because of some jockeying around on the finalization of all of the regulations, we're really looking at final authorization of states being in the time frame of April of 1983, which if you figure, is about two and a half years. But we're looking at April of 1983. It's that point when states will be finally authorized and be running programs that are essentially equivalent by effect to the EPA program that we will be operating in those states that are not authorized.

By way of the effect of the federal program on some of the questions of siting and some of the general issues of site capacity, let me point out a couple of the features of the RCRA program. The law basically states that as of the effective date of the classification criteria, October of 1980, that no storage, treatment or disposal facility can operate without the benefit of permit. Obviously, we can't process that many pieces of permit application paper, and so the law further says that if a facility applies for a permit, that is the basis for receiving a permit on an interim basis, and then the agency or the state that is authorized will process permit applications on some type of a priority basis to actually issue full permits.

During the interim period, that time period when a facility is operating under an interim status permit, there are several standards that they have to comply with, primarily dealing with recordkeeping. In some cases, dealing with groundwater monitoring and the recordkeeping related to that. All facilities have to have permits. The law places a considerable amount of responsibility on the generator of waste. One of the features of the law is the manifest system, which provides a tracking procedure for all waste that's generated and transported offsite to storage, treatment and disposal facilities. A generator has the responsibility of initiating manifests; the generator has the responsibility for proper packaging and labeling the waste, and for providing special handling information to the transporter upon pickup of the waste.

By way of the transporter responsibilities, assuming that the packaging and labeling was done properly and that the instructions were given properly, an accident in transport becomes the responsibility of the transporter, from the standpoint of picking up waste and repackaging it in cases where that's necessary and then transporting it to disposal facilities. In cases where you have a transportation accident, the transporter may well be a generator, in that he's re-packaging a material and re-labeling, and in turn, re-manifesting, in some cases.

The storage, treatment and disposal facility has the responsibility for being permitted to operate and the generator has the further responsibility that he can't send waste to anything but a permitted facility.

There's a couple of impacts of all of that. Right now, we have, nationally, a capacity shortage relative to proper disposal of hazardous waste. Roger mentioned that 90 percent of the waste is improperly handled right now. Now you can see, I think, what will be the impact of defining possibly a larger volume of waste than we presently recognize to be hazardous, and also because of the permitting process for disposal facilities, possibly shutting down some of those that already exist.

The effect of the law will be to, I think, severely complicate the issue of siting capacity, or of disposal capacity. So it raises several issues relative to siting in terms of hopefully avoiding the kinds of predicament we're in right now with the PCB regulations, where we, in effect, say that you can't dispose of the material in the ground, liquid PCBs. We say that you have to store it in a certain fashion. We say that the only way to dispose of it is by EPA-permitted incinerator, but we have no EPA-permitted incinerators. Someone at a meeting I was in the other day mentioned that possibly the long-term answer to the hazardous waste management is to properly package it, label it, and put it on a truck and let the truck run all around the country until we get sited facilities. Hopefully, that won't happen. We'll park them, I guess.

There are a variety of aspects to the Resource Conservation and Recovery Act and hazardous waste regulatory program that come into play in the general concept of the discussion that we've been having today and yesterday on the PCB issue and other accidental-type issues. Obviously, as Roger mentioned, the ultimate disposal of the waste, the mechanism that is used, the procedures that are followed will very much dictate whether there is an end point to the handling of these types of emergencies.

There are a lot of things in this Act that I would be happy to talk about, but I don't want to take up much more time at this point. But in response to questions, I would try to get into them.

MR. WILLIAMS: Thank you, Jon. Another area that probably is extremely difficult to handle, and that is, how do we convince our legislators or the public that it makes sense to have a hazardous waste disposal site located in their state or within a community or adjacent to their community, and Kent Gray is going to talk a little bit about the institutional and political problems that trouble all of us in terms of locating an adequate site. Kent?

MR. GRAY: I think maybe I was given a topic that doesn't have an answer or a solution. May I set the stage a little bit, in explaining how a state is reacting to RCRA. As was mentioned earlier, the program will take effect in October. The program will be either run by the federal government in your states or by your state itself in developing their hazardous waste programs.

We are in the process of trying to develop and finalize our own state regulations to develop an essentially equivalent program to the federal, yet they don't have their regulations finalized. We're working at somewhat of a handicap right now. However, in developing our program, I see myself at times waking up in the form of a nightmare at night, realizing that the program by October will most probably be in place. We will have our regulations in place. We will have our staff in place. And we are anticipating running a hazardous waste program in the State of Utah. We do not have a hazardous waste disposal site.

As Roger mentioned, no one -- and I should reiterate -- no one seems to want a hazardous waste facility in their neighborhood, no matter how safe it may be. When I use the term "neighborhood" it expands greatly in perspective, at times. When you talk to people about the establishing of a facility, the neighborhood can take on the realm of within two miles, three miles, within the county, or even within the state. Most people are coming to realize that we need adequate, safe disposal sites so that we can insure public health in the environment. But emotion takes over at that point -- and I'm speaking now from experience that I've seen in establishing municipal sites, not hazardous waste sites. The emotion that seems to be generated by the general public when it's announced that a facility will be going into their -- quote --"neighborhood" seems to stimulate instant dump-the-dump groups and task forces to oppose whatever you may be doing. These groups are most usually quite educated and well informed. And they arm themselves with experts to expound their case as to why the site

shouldn't be in their back yard. Many times we find them using state agencies, being a regulatory agency, as middle ground where they can attack. They cite the fact that we are concerned and are questioning the geology, hydrology, operational plans of the site as an issue. They say, "Well, if you're so concerned about that, we just don't want that in our back yard." There's obviously the potential of having a catastrophe associated with having that site. What they're saying is, "Can we be 100 percent sure -- not 95 or 99 percent sure -- but 100 percent sure that my drinking water, the air that I breathe, my land values and my quality of life will not be affected? They seem to be demanding almost absolutely no risk associated with a site in their neighborhood. Of course, we cannot give this assurance, that there will be no risk.

Another thing that they seem to utilize is the failures of state and federal programs -- and they cite municipal programs that have been in existence for a number of years. They turn to me in a public meeting and they'll say, "You're now calling such-and-such site a sanitary landfill. Before, you called it an open dump. We don't see much change in many cases, other than the fact that you've changed the name." We haven't been adequate in proving our credibility in the ability to enforce the issues that we're dealing with.

So really the problem that we're dealing with is emotion and how do we overcome this emotion. I think that I would maybe like to make a few suggestions of how we can attack this problem. First, we need to educate the public through public education programs, not only the need of the site, but that there are industries that are developing track records such that we can be assured of relatively safe disposal of hazardous materials. We need to be able to discuss with these people the risk/benefit questions, and we possibly need to get into the issue of discussing economic compensation for allowing a site to be established. Let me elaborate a little bit on each one of those three items.

First off, the public education. When we hold our public hearings to establish our regulations and the possibility of establishing a site within our states, I think that we'll ask you, the general public, to attend. People like I've heard at the conference, the toxicologists, can you attend and expound the things that we've heard in the last two days? Can you be an expert witness for us, saying that the problem exists with the wastes that we're dealing with and we need adequate disposal techniques? We don't need just to bring up the problem. We need to look towards a solution.

I think we also need to, as part of this public education process, get the generators involved so that we can get people associating a product and quality of life, the job that they may have associated with the waste that's generated due to the lifestyle that we're living. We also need to get our elected officials involved and committed to the establishment of these sites. Sometimes it's very distasteful for them to spend some of their political popularity in establishing a hazardous waste site. I think we need to help ease the burdens so that it won't be quite so distasteful to the elected official.

We've talked about, in the last couple of days, the need to deal honestly with the public, the need to explain to them the risks and benefits associated with having sites in their neighborhoods. I think we need to make a statement directly to them. We cannot insure that these sites will be risk-free, but we need to point out that there are firms capable of handling them that have track records behind them so that we will get adequate, safe disposal.

And in the third realm, it's a relatively new concept that I've been hearing about and reading about in the latest legislature, is the possibility of pursuing economic incentives and disincentives for having a site in your neighborhood. Here what we're possibly talking about is letting people know if a site is established in your neighborhood, maybe your community, your county

can tax this site such that you will be able to have a better educational system, that you may be able to have better recreational facilities, better roads, etc.

Again, let me just summarize in saying that the issue in siting seems to be emotion. We've heard horror stories the last couple of days of problems that are associated with improper disposal and I think what we need to center on now is getting adequate disposal sites and adequate state programs and support from the public such that we can handle wastes so that they are taken to ultimate final disposal, whether it's in the form of detoxification, neutralization, recycling, or just ultimate disposal in a safe manner.

MR. WILLIAMS: Thank you, Kent. Jack Peabody is one of those unique or rare individuals that is actually getting some real-world experience in terms of how you operate and manage a hazardous waste disposal site and, I think, is very uniquely qualified to share with us from his perspective what some of the pros and cons are in terms of having each state establish its own hazardous waste site or look at the whole problem of collection and disposal from a regional perspective. Jack?

MR. PEABODY: Okay. The idea that I'd like to project to you, and I alluded to it just a little while ago, is a bold idea that EPA recently came up with. It's called a regional concept. It's based on an economic argument. There is an old saying in our industry that hazardous wastes have a tendency to migrate to the point of least regulation. As a result, with the siting problems that are existing, there are quite a number of areas that are deficient in taking care of hazardous materials, and as a result, since there are not the regulations, a lot of hazardous wastes are migrating to those points.

So the concept that we'd like to project or I'd like to throw out is the idea of the regional facility connected with the collection site. This is a

very successful program and we've found that we've used it across international borders, we've used it across water borders, we have a collection site in the Hawaiian Islands right now. So even very, very long-range type transportation problems can be easily resolved with the collection site approach.

There are a number of advantages with the collection site. To start with, the pure economics of a well-run operation are that the facility is very expensive to own and operate. You don't set it up on a small-budget operation. You view the requirements of monitoring, control and treatment, and you basically go in with all your guns firing and you have to go into a major capital investment before you can even open your door. So it's not something that grows very easily. As a result, there is a tremendous economic requirement.

On top of that economic requirement, these regulations are coming down. There are more and more requirements, restrictions, environmental laundering, and so on and so forth, that are placed upon the facility, getting back to generators, to regulators, letting them know what's happening, how it's happening, as well as trying to input new technology. The advantage with the regional-type centers is they then have a large enough economic base that they can put in these new technologies, they can grow and also provide the best available technology. They also provide for a region a more largely uniform regulation base. If you have a state-to-state operation, what is applicable in one state is not applicable in another. An example right now is the difference between Oregon and California. They're almost toally different in handling hazardous wastes, different in the regulations, the environmental requirements. If you have a spill in California, you have to handle it totally different in terms of what regulatory bodies to contact, how the materials have to be packaged, where they go, through what type of mechanism. So by these regional concepts, larger regions fall under more

of a uniformity. We also find that by having this regional concept, we get more state-to-state cooperation and resolve a lot of the interstate bickering and "protecting your turf," so to speak, as it comes about.

Another advantage of the facilities, by providing a large facility and this collection site idea, we can pass on a tremendous economic savings to the consumer or the actual generator of the waste in that, number one, we use the best available technology, but more that we have a large enough economic base that we can run the operation efficiently.

Lastly, the collection site idea where we have a whole variety of little sites, which are supported to a regional facility, resolves a lot of the siting problems that come up. In most cases, we find that the public finds much more acceptable at a location very localized, very convenient for them, where small volumes of chemicals are brought together safely, economically. They're then packaged and shipped off to a major treatment center. The licensing impact on the public is much more acceptable.

I should probably explain the collection site idea more. The collection site is really a joint state/private operation. Now when I say state/private operation, it is typically a permitted type of facility that we're talking about under the EPA type approach. It's a joint state -- when I say joint state, it would be a joint between the state which has the disposal site which regulations must be met, and will also be controlled by the state who's basically the host of the collection site, in that both states will have to cooperatively work together to make a system work and also meet each individual's demands. The operation, specifically again, is to bring very small volumes together. By bringing them together, you can safely make sure that they're only transported short distances before they are in proper packaging. You can collect varieties of different types of chemicals safely, be it different chemicals which may react, or they could be similar chemicals which could be reclaimed or recycled. They are then properly

packaged if they came in an improperly packaged form. The personnel at the site can oversee the proper packaging, and there's quite a bit of regulation on packaging. I don't know if you've ever looked at CFR 49, but it's a mammoth book on how to properly package, and it's difficult for me and I've read it before -- if you try to go through the book and decide how to package things. The point is for the general public it's almost impossible to try to absorb or understand these packaging requirements, and this is where a collection site can provide a tremendous amount of assistance. The materials are then properly stored under auspices of a chemist or someone with at least some experience in hazardous chemicals and can make sure that they're stored properly; they're not going to interreact and cause problems in the specific location, whether it be in the city or on a truck.

The last thing is, because you're bringing a large volume of chemicals together, you can then use the bulk discounts of major transportation loads, and this, to promote the recycling or the disposal of small chemicals, is added to the cost impact. In other words, the discount that's provided by bulk transportation is passed directly back to the consumer. The consumer also is in a better -- or I should say, the facility, which normally has a minimum operational cost, does not have to impact the consumer so large, in that a collection will bring together small volumes of materials that can be dealt with on small monetary exchange levels.

The last think I think is, the collection site is really the best approach for a region where there is a large amount of distance between major industrial centers, which is what we have in the West right now. We don't have the tremendous density as does the East Coast. And we've found out it's a very workable transportation mode to solve some of these types of problems, which is part of the major cost right now. Transportation is, right now, in the West, the major cost in the disposal of hazardous chemicals.

That's about it.

MR. WILLIAMS: Thank you, Jack. Rich Reiter, with the Bureau of Environmental Quality in Oregon, is also a unique individual, in that Oregon is one of our few states that are actually administering a hazardous waste disposal program. And Rich is going to share with us some of his observations and experience in administering the program, and also a little bit on the liability aspects that go along with that. Rich?

MR. REITER: Oregon has been involved in a hazardous waste program since about 1968. We had our own little incident on the order of a Love Canal, in that we ended up with 23,000 drums of a herbicide manufacturing residue in the desert in an uncontrolled situation. And ultimately, the State of Oregon was placed in the position of having to correct that situation because, first of all, we didn't have any laws that declared that to be an illegal activity to store and to accumulate this material at the site. And the person who did the accumulation did not have the money to properly dispose of it. So it fell to the people of Oregon to correct the situation.

As a result of that, the state elected officials passed the necessary legislation to get the State of Oregon involved in some oversight responsibilities relative to hazardous waste. The primary one, of course, is that we're fortunate in Oregon in that we do have a disposal site. Now as Jack mentioned at lunch, we have a unique relationship in that the State Law requires that over a time, the State become the owner of the site. As the facility is placed into operation, the land must be deeded to the State.

On the other hand, the law is very specific that the BEQ shall attempt to find a private operator of that site. The State of Oregon shall not operate a hazardous waste disposal site. So we have this cooperative relationship between private industry and the State of Oregon.

In terms of specific things that the agency does, of course, we have to license facilities for the disposal of hazardous waste. We have the plan review and approval function on facilities that are installed at disposal sites. We attempt, weather permitting, to conduct monthly inspections. Because of the location of Oregon's site, particularly during the winter time, there are times when it is difficult to get up to the site.

We do require of the company, plus we do our own offsite and onsite environmental monitoring, to assure the public that it is a secure site and there are no environmental problems being created.

And lastly, and again, probably somewhat unique, it is necessary for our agency to review each material coming into the site by any particular generator. And before a generator can use the site, he must obtain the department's approval for use as a disposal site. It does a couple of things for us. One is that it allows us to determine with the company the proper method of handling the material at the site, whether it should go to the evaporation ponds or whether it should go to the viral farm or whether it should be treated prior to disposal. It also allows us the opportunity to look at materials for their potential re-use or recovery. In the area of solvents particularly, at this time, we are directing most solvents to solvent re-processors, as opposed to disposal. And over time, we would hope to increase the number of materials that we direct to re-use and recycling.

Another major activity is an oversight function relative to generators. We do have a registration requirement in Oregon. The generator is supposed to take our rules and make a judgement as to whether or not his byproducts by definition are hazardous wastes in Oregon, or whether they're just solid or industrial wastes. If he determines they are hazardous wastes, then he is required to register with us as a generator of hazardous wastes. Once he has made that judgement, then he also has other responsibilities, the key one

being the initiator of a manifest system. We have an operational manifest system in Oregon at this time, and that manifest requires him to only use licensed transporters and to identify the treatment or disposal site that the waste is to be hauled to.

In the area of licensing transporters, we do not do that directly. That's an activity that's actually performed by Oregon's Public Utility Commission. But it was at our request that they actually adopted the necessary regulations so that companies transporting hazardous waste in Oregon are licensed by the State.

Starting this July, we will be getting involved in licensing of treatment facilities. One of our deficiencies to date is that there is no statutory requirement for the licensing of treatment facilities such as the solvent re-processors. But once we adopt our administrative rule, which we hope to do in April, then we will be back into a licensing procedure for treatment facilities. We would be looking at plan review and approval for treatment facilities. We would be expected to conduct site inspections, and we would be expecting to have the owners of these treatment facilities do certain onsite and offsite environmental monitoring, as well as we would perform independent monitoring to verify their monitoring.

Jack has talked quite extensively about collection sites, and we're very supportive of that idea. When we originally talked about collection sites, we assumed that for the most part, they would have to be publicly owned in order to find people who would be willing to foot the bill for the capital investment, assume the liability for maintaining that. As it turns out, however, the only four collection sites we have in Oregon are privately operated and it's working very successfully. In one case, it's associated with a treatment facility; in two cases it's associated with a transportation company; and the fourth site is at the disposal site, so that the people living in the

vicinity of Arlington have access directly to the site in small quantities.

In Oregon, we have defined small quantities as 2,000 pounds, 250 gallons, or 35 cubic feet. So if you generate less than that amount, then that would go through the collection site program, and the advantage is that the paperwork and the tracking process is substantially reduced for the small quantities.

Again, we do license the collection sites. We perform a plan review and approval function on the facility. We conduct periodic inspections of the facilities, and to the degree that we determine it necessary, we may require onsite and offsite monitoring around collection sites.

Two other functions that we're involved in relative to transportation-related spills, we're the lead agency in responding to transportation-related spills relative to hazardous materials, and the role we play is primarily the role of advisor. We work with the person responsible for the spill to determine what cleanup is required, and also assisting that individual in determining his disposal operations for the material that is cleaned up.

Lastly -- and right now this is very important -- we do intend to assume management of the federal program in Oregon, and much of our time at present is spent trying to anticipate what the federal requirements will be so that we can get our state statutory authority and administrative rule authority in place, so that we can make application for authorization to manage the federal program.

In the area of liability, I guess to a large degree, the elected officials decided that issue back in the early '70's, in that by assuming ownership of any lands used for disposal purposes, the State, in fact, has assumed the long-term liability responsibilities for the disposal of hazardous wastes. On the short run, we do require liability insurance from operators of disposal sites, and we will be requiring the same of operators of treatment facilities. At this time, we haven't found it necessary to actually require a substantial amount from the collection sites who are dealing with small quantities of materials. Again, we

wanted to reduce the administrative burden so that we could encourage the creation of these collection sites rather than discourage the creation of collection sites.

Again, as Jack mentioned, we also require some bonding by disposal sites to provide for post-closure and post-monitoring after a site would be closed.

But I think the key thing, as far as Oregon was concerned -- in the early '70's, the elected officials felt that they had a direct responsibility and they were willing to assume that responsibility for the long-term liability.

MR. WILLIAMS: Thank you, Rich. Before we open it up for general questions, I'd like to pose a couple of questions that are on my mind to the panel.

Q MR. WILLIAMS: First, Jon, I wonder if you could describe the interim criteria that are going to be governing this fall for a disposal site, the criteria for the selection of a site, and the criteria for possibly operating the site.

A MR. YEAGLEY: Okay, the criteria that I mentioned earlier basically relate to reporting requirements or record keeping requirements for facilities operating under interim status permit. When I use the word "facilities," I'm talking about storage, treatment and disposal facilities, those that would require a permit.

Let me give you an idea of some of the requirements that they'll be dealing with. One is the requirement for groundwater monitoring, if they presently have a groundwater monitoring system in place. They have to record the data and provide the data to EPA or the state as the regulatory agency. The facility has to have a closure and post-closure monitoring plan in place at the facility and available to the regulatory agency upon request. Presently, the facility would be required to provide financial assurance in the form of a trust fund or bond which would be available to the EPA Administrator or the director of the state program to assure that the closure and post-closure monitoring plans can be carried out in the absence of the company, should they go under or leave or whatever.

In addition, there are security requirements, fencing, controlling access, etc.; general record keeping requirements relative to the manifest system, volumes of waste, types of waste, where the waste was placed in the fills, etc.; and then also reporting requirements in terms of all this data that I've mentioned -- reporting it to the regulatory agency.

Q MR. WILLIAMS: One of the things that concerns us all here in the West is the fact that an awful lot of the land is owned by the federal government. I wonder if anybody on the panel knows whether BLM or Forest Service land or any federal lands are going to be available for location of hazardous waste disposal sites.

A MR. YEAGLEY: I'll respond to that. That's a problem near and dear to the hearts of the people in Montana, here. The Bureau of Land Management, which is the management agency that controls the majority of the federal land in the West, has on their books at the present time a regulation that says that no hazardous waste will be disposed of on BLM-managed property. They define hazardous waste in an interesting fashion -- anything that lasts over five years -- which covers every kind of waste that you might want to dispose of in the ground. The Bureau argues that they are not a waste management agency but a land management agency, which I think is the proper attitude. They do, however -- I'll say this with tongue in cheek for the benefit of the people from Montana -- they do make land available through trade and sale for uses -- and I'll include in the word, "uses," waste disposal and possibly hazardous waste disposal. People in the Bureau of Solid Waste Management of the State of Montana have made an attempt at that and found that they couldn't get the land. One of the reasons was that the land was completely surrounded, as I understand it, by other BLM land and most agreements that BLM signs to transfer property have what they call reversion clauses in them, which in this sense means that if the land discontinues -- that is, stops being used for the purpose it was originally sold, it reverts back to the BLM. And they obviously don't want land disposal sites back. So I think there's some potential from the standpoint of using federal property. I think it's safe to say that, given the present system, it would not be federal property at the point in time that it was being used.

Q MR. WILLIAMS: Okay. Lastly, I wonder if someone on the panel could kind of describe what they think the situation is going to be this fall when all the regulations are in place. People are going to become very concerned about handling hazardous waste and they're going to be wanting to take them to an approved facility, and so forth. Are we going to be in the situation where there's going to be very few sites that could take this material? Is Oregon only going to have one site if they get interim authorization in operation in the state? Are we only going to have ten across the country, or twenty? What kind of situation are we going to be in come November of this year? Anyone?

A MR. PEABODY: I guess since I see the majority of the waste right now, it's only fair that I take a shot at this. At present, our biggest problem is trying to determine how much waste is really out there. Again, as a private sector or private company, we're based on economics. From what we have seen so far -- for example, take the State of Montana. It's very unclear what types of volumes, what types of chemicals are going to need disposal in the near future. We're looking forward, actually, to the registration by EPA so we can, for the first time, get a handle on what volume of chemicals and what types of chemicals are actually out there. We've seen, for example, last fall the State of Washington and Oregon simultaneously, almost, implemented their rules. As a result, we had been operating in the State of Oregon for about four years at that point, where the regulations, when they went through, trippled our business. So it's hard to say what the final impact -- we expect that it may be substantial, but then again we have been surprised many times in the past where things didn't creep out of the woodwork like we thought they would.

A MR. REITER: I guess from Oregon's viewpoint, we have, and I think we will continue to maintain that we have a regional disposal site available for use, not only by the State of Oregon but by other areas. Now, we do have an understanding at this time with our operator that there are limits to what that service area will be, and we like to talk in terms of the Pacific Northwest, which includes states such as Montana, Utah, Canada, Alaska, Hawaii. And we're not uncomfortable with the volumes of waste that we anticipate could be generated by these states, which are -- when you look at the industry, it's relatively low industrialization at this time. It's a good site. We're comfortable with the operator we have. And we see no particular advantage to deny other states the use of the site. On the other hand, one has to be realistic, that if it was the only site -- much like radioactive waste disposal, where there are only three -- there would be public concern about that site, which we don't seem to have at this time. So we're comfortable that, with the single site, and with the types of wastes being generated by the Pacific Northwest or the Rocky Mountain states, that we can continue to operate in the manner that we have.

A MR. YEAGLEY: We've been presenting something of a dismal picture, here, I think. I'd like to add to the dismal nature and then try to qualify it just a little bit. The kind of site that Chem Nuclear has right at the present time is basically chemical waste disposal site -- what I'll say is a multiple use, that is to say, multiple types of chemicals. Based on the definition of hazardous waste as we come out with it, if you go back to our definition of solid waste, of which hazardous is a sub-part, we deal with agricultural waste, mining waste, industrial waste, municipal solid waste, and municipal sludges. If you look particularly in the area of mining waste and think of those that might be classified as hazardous, and possibly wastes from, let's say, smelters, metal extraction type facilities, iron, steel mills, things of that nature -- we're talking about very high volume, in most cases relatively low hazard waste, and yet still classified as hazardous waste. Obviously, I think, those types of wastes probably won't be shipped very far, certainly not to Oregon from any distance away.

In those situations, we're going to have to be in a position to site waste disposal facilities very close to the generation point. Either that, or we're going to have to stop extracting metals from ore, which I think is not a good alternative. The other thing I'll suggest to possibly add a little better light to the disposal volume for the chemical waste situation is that, when we talk about ten sites nationally, we're talking about ten sites that are commercially available to all comers. We're not talking about those onsite facilities that only serve the generator; he doesn't allow anyone else to bring waste into that site. There are many of those. We anticipate receiving applications for permits for many of them, and I think it's safe to say that we anticipate issuing permits for some of that many. So the actual situation may not be quite as dismal as ten nationally.

I think it's safe to say, however, that come October, when the law says everyone has to go to permitted facilities and the law says that only those permitted facilities can operate, that we're going to have significant change in present lifestyle of hazardous waste management. We're going to have a lot of waste in storage, anticipating eventual siting of disposal facilities, either increasing the operation of those presently in place or the onset of new disposal facilities. One thing I neglected to mention earlier that I think I might put in right here. I see Vern walking over, so I'll start talking a lot faster. The new facilities, those that come into place after our regulations are in effect, do not have interim status.

They have to apply for and receive a permit. And so there's a lead time involved in doing that. And I think it's relatively safe to say that it's impossible for a new facility all of a sudden to show up and begin operating in October of 1980. And I think that in my mind that just supports this storage issue that we're going to see.

MR. WILLIAMS: Thanks, Jon. Let me open it up for questions from the floor at this point. (NO RESPONSE) No questions at all? Sleepy after lunch, I guess.

Okay, I would just wrap it up with a recommendation, if I might. Clearly, a hazardous waste disposal problem is probably the biggest issue that we're dealing with in the whole hazardous waste area, and I think it's going to be a longer term issue, and we've only been allotted 45 minutes for discussion at this particular conference. And I would like to recommend that at some point in the near future, it might be appropriate to get this group together again for a two-day meeting solely to focus on that hazardous waste disposal problem. Because I think it's that big of an issue. It's going to get bigger, and we could utilize the time effectively in that regard. Thank you.

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MONITORING AND TESTING

Monitoring as conducted in the United States is a process that is designed to follow a chemical through the environment over time. Basically there are reconnaissance, surveillance, and subjective monitoring. Reconnaissance monitoring is designed to include periodic checks on levels of a chemical in the environment and to determine any changes in these levels over time. Surveillance monitoring is usually used to denote observations that are made periodically to support regulatory enforcement programs. The term subjective monitoring is a term that is usually used to provide information on the levels of a contaminant in the environment from accidental spills etc.

In the past monitoring efforts have been conducted by a number of private and government agencies. National environmental monitoring programs in the United States include the monitoring of pesticides in water, soils, wildlife, and air. In addition, programs to detect residues in food include the market basket survey, crops and commodities, meat and poultry. Several studies have also been conducted to detect toxic substance residues in humans through analysis of adipose tissue, blood, urine, hair, milk, and other substrates.

In well organized monitoring programs every effort should be made to utilize the team approach, The team will usually consist of the chemist who is responsible for the analysis, the environmentalist or field investigator who conducts the sampling, a statistician who is responsible for sampling design and the program director. The team should be certain that sampling site selection and methodology, storage, shipment, and sample field identification are understood by all of the team members. A human monitoring program can be used as an example of the

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use of biostatistics in a monitoring program.

Since samples should be representative of the population to be sampled, the population to be sampled should be carefully defined. A second step is to arrange for the selection of a sample from the population in such a way that all of the population has an equal chance of being included. Analytical results of an environmental chemical is only as valid as the sampling scheme and sampling procedure used in their collection. Samples should be truly representative of the environmental component being examined and should have complete compatability with the goals of the monitoring program. The location of sampling sites, sampling technique, transportation and storage of samples, and frequency and duration of sampling should be designed so results can be evaluated in a statistical manner. The sampling should enable replication and confirmation of analyses.

Environmental samples collected for monitoring usually include soils, water, sediment, and air. In addition, the environmentalist may collect human substrates, crop samples, or animal tissues.

Prior to collection of samples the person making the collections should discuss the types of analyses, sample collection and storage procedures with the analytical chemist.

Samples other than water should usually be stored in a freezer, preferably below 0°C. Water samples should be stored slightly above freezing to avoid rupture of the container as a result of freezing. Samples should be analyzed as quickly as possible after they are collected to avoid physical and chemical changes. If it is necessary to store samples for a period of time it is usually desirable to extract the sample, removing the solvent, and storing the sample extracts at a low temperature.

Tissue samples should not be frozen if the samples are to undergo pathology tests. On the other hand if tissues are to be analyzed for pesticide residues they should be frozen. These are the type of details that should be known prior to sampling.

Since light may degrade some chemical pollutants such as pesticides, these samples should be protected from exposure to light.

Plastic containers and plastic lined caps should not be used to collect pesticides, since they interfer with analysis. Glass containers should be used for water. The containers should be rinsed in a solvent such as hexane, acetone, or isopropanol. If possible, containers or wrapping materials should be checked prior to sample collection to make sure that there are no analytical interferences.

The role of the analytical laboratory is to provide quantitative and qualitative data to support the monitoring system. To be of any value the data developed by the analytical laboratory must accurately describe the characteristics of the concentration of constituents in the sample submitted to the laboratory.

To insure that the data is reliable, rigid quality control programs must be followed by the participating analytical laboratories. The quality control programs consist of several primary functions. These are designed to monitor the reliability of the results reported--some call this a measurement of quality. A second requirement is the measurement of reliability.

The operation of a successful quality control program includes the strict adherence to intra and inter quality control efforts. This includes analytical methods, training of personnel, instrumentation, clean-up procedures and the analyses of spiked samples. The exact steps used in quality control vary with

the type of analysis. Ideally all of the variables that can have an effect on the final data produced by a laboratory should be considered, evaluated and controlled.

The analytical method used should meet the following criteria:

a) The method should measure the desired constituent with precision and accuracy.

b) The method should be routinely used in several laboratories to establish its validity.

c) The method should be sufficiently rapid to permit routine examination of a number of samples.

d) Chemists and technicians using the method should adhere to the accepted method. They should not attempt short cuts to the method.

Instrumentation should be maintained at a high degree of operating efficiency. Modern analytical laboratories have a number of expensive instruments for use. These may include spectrophotometers, mass spectrophotometers, gas liquid chromatographs, atomic absorption, etc. Regardless of the type of instrumentation the manufacturers instructions for proper use should be carefully followed in all cases, and a routine instrument maintenance program should be established.

Chemical reagents, solvents and gases are available in a wide variety of grades of purity. The purity of the grade range from technical grade to "ultra pure" grades. The purity of the grades required in analytical tests varies with the type of analysis, and the sensitivity and specificity of the detection system. Reagents of less purity than that specified by the method should not be used. Reagents should always be prepared and standardized with the utmost of care and technique.

Reagents, solvents, and gases must be properly stored to prevent contamination and deterioration prior to their use. "Standards" of reagents and

solvents must always be stored according to the manufacturers directions. Standards should not be kept longer than recommended by the manufacturer as stability is an important consideration.

In summary the monitoring and testing program should be well planned, implemented and evaluated as a total unit with each portion of the total unit developed to supplement the total program effort.

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MONITORING AND TESTING PANEL

Thank you, Dr. Savage. The panel assignment today is to discuss monitoring and testing, and the panel members before you today are Jim Swanson, from Region X, Food and Drug Administration, from Seattle; and we have Dr. Neal Whitney, Director of the Field Laboratory Services, from USDA, Washington, D.C.; and we have a fellow State Government employee, Cal Campbell, with the Department of Health and Environmental Sciences; and my name is Roy Bjornson, with the Montana State Department of Agriculture.

At the banquet last night, we met briefly to talk about the format of our panel, and the panel members were quick to realize that probably at this point in the meeting, we may be becoming saturated with all the information that we have, and also that we may be starting to suffer from TB -- and that's not lung disease, that's tired butt. So the members of the panel today do not have any formal presentations, but do have a lot of answers on questions that relate to monitoring and testing. They are prepared to answer questions on monitoring and testing programs as it relates to national problems and also probably as it relates to more local problems such as we were experiencing with the Montana PCB incident.

So just a brief few comments probably to set the tone or, hopefully, to give you a minute to be thinking about the questions that you would like to ask these members. Recently, our PCB -- the sampling mechanisms deployed by the various agencies literally jammed the laboratories assigned across the nation for determining the results of the samples. And to further complicate the procedure, the producers at the local level could not understand or even comprehend the turnaround time of those sample results. And I think that's probably one of the things that I hope some of you people will ask questions about to these gentlemen. I know

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Moderator: Roy Bjornson, Administrator, Plant Industry Division, Mont. Dept. of Agriculture, Scott Hart Building, Helena, MT 59601

that, in reading the USDA report, we find that USDA has a very sophisticated monitoring system which, obviously, detected the problem, and probably FDA has a more investigative type of monitoring system, which is somewhat patterned by the states. So, we are ready to begin now, and we will entertain any questions that you may have. Question number one?

Q MR. FERGUSON: Bob Ferguson, from British Columbia. We, in the course of some of the problems that we encounter, particularly with PCBs and pentachlorophenol and this sort of thing, find that when you're involved with drinking water supplies, the levels of contamination can be detected at such low quantities, that you're never really sure when you get a result if that is the result. And you really hesitate to go out on a limb and make an announcement to the public that they are affected or that their drinking water may be affected, or that it may not be affected. And so we find ourselves asking for reruns on the sampling and on the testing, just to confirm what we had found the first time.

And secondly, when you do get a different number, then you ask yourself the question: Is that number representative? We seem to run into a problem of -- I think sampling is probably the source, where the individual sampling may not have the proper feeling for the possibility of contamination, and they're looking at such low quantities -- in the parts per trillion range, in some cases -- and it's so easy to contaminate a sample that even by walking over an area which was contaminated with PCB, your sample can be contaminated by walking into another area. Have any of you ever seen any definite or laid out procedures for proper sampling that look at these sorts of things?

A MR. SWANSON: That's a lot of question, Mr. Ferguson. The sampling procedures will vary with what the potential contaminants will be. In the PCB incident here -- which wound up here and started over in Idaho -- the levels were high enough so that we weren't that concerned about carrying contamination from one place to the other. But the actual fact of sampling, as long as we were using clean glassware and trying to stay away from certain plastics, that was not a problem. If you get into dioxanes, where you are actually doing parts per trillion and trying to quantify at those levels, yes, you have a very, very difficult problem, not only in sampling but even in handling in the laboratory. What we have tried to do is maintain, as Dr. Savage has said, an attitude of a moving zero, that the reproducible levels become what we would say would be the action levels, such as like 3 ppm in chicken fat. Although a good analytical chemist can get below that and be confident in it, but trying to reproduce it with any degree of confidence in another laboratory is very difficult. So our action level actually becomes zero, although it is not zero. As we get considerably more skilled at operating our equipment and being able to produce reproducible results, that zero is going to go down. In other words, zero will be two or one or whatever. But we can't say -- and we have tried not to say that anything under three was zero.

MR. BJORNSON: Okay. Do we have any other questions?

DR. SAVAGE: I think that the area that he has mentioned is a very, very difficult area. And probably one of the reasons that it's difficult is most people that have worked in any type of preventive health, in taking water samples, have been used to just taking grab samples and many times, unless you can concentrate the amount of material by passing the numbers of gallons of water through the sampling device, you will not find whatever the contaminant is except at such low levels that you won't know what it means after you get it.

We've recently tried a couple of sampling devices inside homes that in one way have some promise and in another way they add more problems. One of them is -- you probably have seen various types of commercial filters that you put on an inside water path -- you see them advertised all the time, by the commercial group that manufactures some of them. But we did have that group give us some of their filtering devices and we have tried to see what we could pick off of that filter. And I think that maybe if there was some money for some research in this area, that it might help answer some of the questions about what some of the contaminants are in water at a very, very, very low level. But probably the most interest that anybody has is in the dioxane group, whether that is in some very, very rural or different types of water supplies that might be exposed.

Q MR. BJORNSON: Dr. Whitney, we've, in the last day and a half, seen a very extensive list of chemicals. Would you care to comment on some of the screening tests that we have available and how difficult it is to get the procedures on board, etc.?

A DR. WHITNEY: Currently, we can analyze for 40 of approximately 146 known contaminants that occur in food products. Our limitation, of course, is technology. We just do not have the methods to get down to analyzing in parts per trillion for dioxanes or some of the more sophisticated residues that occur in food. In developing methods -- I'm not a method development specialist, but in coming across a new method, the technology is subjected to a collaborative study among a number of laboratories. A collaborative study will run through a number of repetitions of samples of incurred residues or spike samples, and they'll find out the repeatability of the method. The lead time to get a method into use is somewhere near a year. Right now we're working on some rapid screening techniques for sulfa drugs and this has been going on for about eight months. We figure the collaborative study and the ruggedness test to get them into the laboratory will take another three to four months. It's going to be a little bit quicker because it is a screen and it does not have to be what is called an official method recognized by the ALAC for acceptance or rejection of product. I think that about covers it.

MR. BJORNSON: Anyone else have any questions?

Q MR. PEDERSEN: I'm Dick Pedersen, State of Montana. We have kind of a problem in the Western states in that a lot of times we're a long ways away from laboratory facilities, and various parameters might have a holding time that is almost impossible for us to meet. How would you overcome that problem if you have 450 miles to go and try to meet a recommended holding time that was established, say, by EPA or whatever, to use that data? Is there some way that that recommended holding time could be addressed to say that the numbers that you generate after that specific holding time aren't necessarily invalid?

DR. WHITNEY: What do you mean by a holding time?

MR. PEDERSEN: What I mean is, from the time you collect a sample until you get it to the lab, you have a certain period of time to analyze it.

A DR. WHITNEY: The specific residue or toxic substance that you're looking for will degrade over time. We receive a lot of samples in our labs. For example, rancid fat will distort the result that you get on a PCB analysis. So the times have to be met. Quite often we'll discard a sample because -- particularly in the monitoring program, because the data that you get would not be very useful. I don't know if that answers your question. I don't know how you can overcome -- (LAUGHTER) -- we all have the same problem.

Q MR. PEDERSEN: I guess my major question is, how are these recommended holding times established, and are they real applicable?

A MR. SWANSON: The laboratory people, of course -- and I'm not one of them; I'm one of those poor administrators who has to deal with the questions that you have all the time -- are adamant that they have to have things on time. And it is unfortunate that it then falls to a good investigator like yourself to be creative in getting that sample in. We have that same problem in Alaska, obviously, in trying to catch a water sample out on the chain and get it in someplace on time. For instance, in the PCB episode here, or in Idaho, when we were trying to find out where it came from, it turned out that the one sample that we finally laid our hands on and shipped to Seattle for analysis was in the air when the airline went on strike. And they landed in Seattle, put it in a warehouse, didn't know where, wouldn't answer our questions; we finally had to go drag somebody out of Hughes Airwest by the collar and take him around from place to place to find that thing. But it took a week. It turned out that that was the one sample that led back to Pierce Packing. But it's a problem. There's no doubt about it. And there's no one answer to it. If, in fact, the sample does degrade in time, there is no such thing as a checklist that says that in two days it's going to be "x", therefore you can extrapolate back. It just doesn't work that way.

A DR. SAVAGE: I think you can do something, if you're collecting samples in the field, that will really help. I think, number one, if you will talk to the laboratory that's going to do the analysis prior to the collection of the sample and if you'll tell them what your schedule is. The second thing that we've done occasionally is to have samples put on a plane by a plane courier service, and you cut down, I would say, the time element by utilizing that. Although it's expensive, you could probably cut down the time by a third. I was sending a sample back from Mexico City one time to our laboratory and I slipped the guy at the airlines $25 and we had it at Fort Collins in ten hours, which I thought wasn't bad. That's about two bucks an hour and it really got the sample there.

I think the place that you run into the biggest problem is when you have somebody collecting the samples, they're out in the field, and they try to bridge a weekend, or they don't notify the person at the lab when it's coming in. Some samples, if they're a cleanup procedure, where it takes a couple of days to run it through that process, if a guy gets it on a Friday morning, and maybe he's planning on doing something on Saturday, he probably isn't going to be very interested in getting it started on Friday unless he knows what's coming. I think that's really how you solve that problem in part.

DR. WHITNEY: Let me ask you another question. Do you have shipping containers in which you move your samples frozen?

MR. PEDERSEN: Yes.

DR. WHITNEY: If you're getting any kind of reasonable transportation service for the samples, you shouldn't have any problems in your analysis.

MR. PEDERSEN: I'm thinking in terms -- maybe not necessarily toxic substances -- but the holding time might be six hours or less, or something like that; when you're in Montana, it's a long distance. And the point I'm just trying to make is that the coordination that is needed prior to -- people out in the field, coordination with the laboratory in order to get the analysis done in a reasonable amount of time, because ultimately, that data might be used for a legal consideration and if you exceed that recommended holding time, it's no good.

DR. WHITNEY: We've never experienced that, unless the sample itself is rancid, spoiled, thawed -- a frozen sample is a frozen sample and it still can be analyzed except, as Dr. Savage was mentioning, if you're doing confirmation. For chemical residues, you can analyze them for adulterants. If the sample's in decent shape, the results are valid. And they're valid for regulatory purposes, and we would be willing to go to court. We've never had a problem.

MR. BJORNSON: Okay. Any more questions?

Q MR. HEALTON: One of the key things in a monitoring program is the general schedule of sampling, and I think all agencies follow some kind of a basic surveillance program in which you know you're going to collect a bunch of samples; you know that you want to collect them and probably end up batching them for analysis because it's cheaper to run them that way. Invariably, the one hot sample that turns out to be the one you wished you had run the day it was collected is run a long time later in the routine of business. One, is there any way to prevent that? And two, is there any way to convince the media that that really wasn't a bad thing to do?

A DR. WHITNEY: We got into a lot of hot water over the Ritewood chicken. There were delays in shipping; people said it was in the lab for twenty days, thirty days. It was just absolutely not true. The sample was there fourteen days. Over the years, our lead time to turn around a monitoring sample has gone from something like thirty days down to fourteen days, and that includes the shipping time, the day it was shipped by the inspector, received in the lab, the analysis started, the analysis completed. The Ritewood chicken came close to making it, except that we had a slight problem in shipping. You can't anticipate problems. They're going to come in. And we try to maintain a fourteen day turnaround time on a monitoring sample; we try to maintain three to five days on a surveillance sample. That couldn't be done in Montana; that's just impossible. We would be overwhelmed. Some of the labs were receiving 100 samples a day. Lab capacity is about 100 samples a week. So we just didn't have the capacity. The average turnaround, I think, for a producer sample was something like two and a half weeks. Some of them went days, and some went as long as a month. But we did the best we could.

A MR. SWANSON: We try to use a planned monitoring schedule for our routine sampling, particularly in our pesticide area, where we have a team approach, of a pesticide monitor team. They aren't the ones that do the work; they're the ones that do the planning, which would involve somebody in the investigative branch and somebody in the laboratory who will actually plan out what is going to be collected when. And it depends upon the seasonal nature of the product involved, the problems of where they're going to be getting them, and also what potential violations historically, that we've run across, we think might occur again. We are dependent a great deal on the investigator in determining what it is we're going to sample. We don't try now to go out and just blindly collect batches of samples to have the laboratory do the monitoring on. We feel that our time would be better spent to actually go out and talk to universities and talk to EPA and talk to state laboratories and the state departments of agriculture and departments of health, to obtain information on what is being used. We'll talk to farmers; we'll talk to aerial applicators, just to find out what's going down on those crops, and then collect samples as selectively as we can and get them into the laboratory, with information to the laboratory as to, "Hey, this is what you should be looking for." It saves a lot of time, and this way we can keep a steady flow of samples going into our laboratory and not have a big delay.

Q MR. BJORNSON: Thank you. Cal, would you like to -- Cal and I worked very closely in reporting out the sample results as they came in, and we were faced with two different methods of reporting, one from FDA and one from USDA. Cal, do you want to briefly talk about that for a minute?

A MR. CAMPBELL: Yes, thank you, Roy. Every time I think about when this PCB incident happened, I think back 25 years ago when I was in the service in Europe. The Europeans were convinced that we won the war by mass, organized confusion. They couldn't figure out what in the world was going on. And every time we get into one of these investigation systems, that comes into mind. Everybody is coming and going and questions are being asked and you can hardly keep up with things. You try your best to communicate with everybody that needs to know. And you have hundreds of questions from various other aspects and you do try your best to get the answers to the people just as quick as you possibly can. At times, there would be anywhere from fifteen to twenty calls waiting while you were talking on a previous one. It all worked out great, though, and the reporting from the labs would come to us and then we would immediately call the results to the producers. We answered a zillion questions at that time, and it really worked great. One thing that did cause us some problems was when the method of recording the tolerances apparently changed and we were unaware of it. Since then, it has been explained to us, and it makes a lot of sense, and I think I'll let Neal expand a little further on that.

DR. WHITNEY: Thanks a lot. (LAUGHTER) I don't think anybody in Montana believed it. The tolerance for PCBs in fat is three; it was three when we started; it was three all the way through and it's three right now. 3.0 ppm. Now, when we analyzed the Ritewood chicken, it was a single sample. When the fat hit the fan later on, and we started getting hundreds of samples in the labs, and we knew exactly what we were looking for, you go to a technique called composite. You take six samples of fat, you render them, you put them together, and if you find a value of .5 ppm, just by simple mathematics, 6 times .5 equals 3. That means that one of those animals could have 3 ppm. At that point, you take separate aliquots of the same samples and you run them individually. And if you find three, the flock of birds is condemned. And

this worked for a while. It helped a little bit. And we were still inundated. And the producers were yelling at us. And the state officials and Congressmen and everybody else. I'm surprised at the number of calls we got concerning the turnaround time. We turned to the statisticians, and the statisticians did not change the tolerance. They changed the method of compositing and taking an analytical value that indicated what a high degree of probability that within that composite there was an animal that had 3.0 ppm or more. We are guilty of not putting out good information explaining exactly what these results meant. People would get results that were less than 3.0 and it never should have been on the forms. It should have said that you had a result of this, the probability is that within your flock or herd there is an animal with an excess level of PCB above the tolerance established by FDA.

MR. BJORNSON: Jim, would you care to comment?

A MR. SWANSON: Yes, it was a jargonal problem. And we got caught in it, too, in the Oregon situation. It became a media event, unfortunately, and it truly was just a jargonal difference. So it's all a matter of understanding each other's jargon. When we did the composite samples, we would take the composite average in FDA, and if it came out 2.5, then it was a "no action" as far as we were concerned. Yes, statistically, there very probably was one of those individuals, but we were talking about lot averages. We did not realize that USDA was using the kind of assessment that they were. When we found out, then we understood.

DR. WHITNEY: I think another, too, is that there are different tolerances for different products. Jim, correct me if I'm wrong, but in feed additives, you have a tolerance of 2.0 ppm and finished feed is .2; in eggs, it's .3; in meat fat, it's 3.0. The reason for all these are that based on the metabolism of a human being and the metabolism of an animal, how much of this is going to get through to where it reaches a harmful level in the fat of an animal or in the fat of a human. These are why you have different levels. You can't have a universal level.

MR. BJORNSON: Okay. I think Cal and I could probably tell you all kinds of different stories on trying to interpret the analysis. For one thing, when you're talking to our friend that wears a little black suit and has a beard and you're trying to tell him that his eggs are way out of line and his chicken is okay, he just can't conceive that. The chicken laid the egg. And how did that happen? We really did have all kinds of experiences like that. And it's a matter of interpretation in terms of testing and monitoring. And that's very enlightening. Okay, do we have any more questions?

Q MR. YEAGLEY: I'd like to ask a question that's just a little bit different. My name is Jon Yeagley, Environmental Protection Agency. In regard to the comments that I've heard so far -- I've heard you say that your laboratories are packed with samples. You have a difficulty meeting schedules to get them

out. Our hazardous waste program is coming along. We have a testing procedure that requires the industry to test its waste to determine if it is a hazardous waste. There are sampling and analytical requirements as far as the waste as it's generated. In some cases, disposal facilities will require spot check sampling and analysis of waste at the site. We have monitoring and analytical procedures required in terms of permit compliance. And on and on and on and on and on. The question I have -- we've talked earlier, I guess, about the disposal capacity -- the question I have is, is this whole system going to fall apart because of the lack of analytical capacity to keep up with the load of chemicals and the uses of the chemicals and the samples that result in trying to get a handle on what all of that is?

A DR. WHITNEY: I'm also chairman of the Interagency Regulatory Liaison Group, and it's very hard to say. Dealing with laboratories -- Jon, where are you from?

MR. YEAGLEY: Denver.

DR. WHITNEY: You're from Denver. Okay, the Office of Toxic Substances, in EPA, is chairing one of the subgroups that I have, and the title of the subgroup is, "The Availability of Toxicity Testing Laboratories." They have a very, very optimistic, progressive program. It will probably start in about two months. They are selecting a contractor to make a study of facilities, and essentially what they want to do is model the world. (LAUGHTER) No, it's not a joke, really, they're going to go out and, by survey questionnaire, find out exactly what exists in the public and private sector in the way of toxicity testing capability. Facilities, resources, people, equipment, the full range. They're going to look at the international community, also. Beyond that -- well, they were going to do this on their own. Now, beyond that, when we brought this into the form of IRLG, what they're going to do is take five participating agencies and try to establish what their future needs will be in the area of toxicity testing so that we can find out what kind of a load we're going to put on, well, certainly, domestic capability in this area. I hope it works. It's going to be needed. It's going to be a mathematical model, and then we can test it and see what hazardous waste disposal will do, what registration of pesticides will do, etc., on down the line.

Q MR. BJORNSON: Cal, do you think the state labs can keep up with the analysis, testing, monitoring?

A MR. CAMPBELL: We have a very small capacity in our particular laboratory. In the beginning, before we started collecting the small producer egg samples, the lab was equipped to do PCB analysis in water samples, so the transformation into doing the eggs was not too difficult. With the help of USDA, we were able to get involved. But we did have to do a tremendous amount of scheduling so that the lab didn't get inundated with samples. It seemed to work better by the producer holding the samples until we were ready for them, rather than to have the laboratory holding them, waiting to get to the sample, and it seemed to work pretty good that way -- better, anyway.

DR. SAVAGE: I think that you've opened up a whole new bag of worms. I know that, from a hazardous waste standpoint, that the sample that a laboratory will get is probably going to be a mixture of something. And when you get into mixtures, you immediately run into the methodology problem. And I personally have the opinion that, in the next decade, we're going to see development of

some type of a testing mechanism that's not going to be an analytical chemical mechanism that you do screening with off of samples like you're talking about. And I think you're going to be able to do them a lot cheaper than you ever could in a lab. And you wouldn't go to the lab as we know it now unless that sample was positive. And I think if there's a little bit of money put into it, that you could see some testing, using biological organisms of one type or another that could be used probably at a more rapid use, and probably a lot more economical. Because if you just look at methodology alone -- I don't know what all's going in that hazardous waste disposal site in Oregon, but I'd be willing to wager with somebody that we don't have methods to detect an awful lot of it, even if we have a good, purified sample that we got. If you add it into a mixture in trying to get it out of some other media, I think you just compound the problem. And I think you're going to see that thing change, personally. I think there's kind of a move -- you see more people interested in research in that area right now than there were, at least -- not necessarily from government agencies, but some others.

MR. BJORNSON: Okay. Any other questions from the audience. (NO RESPONSE) Hearing none, seeing none, any comments from the panel? (NO RESPONSE) We thank you for your attention. Thank you.

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MR. PETRALIA: Thank you, Vern. So far, over the last day and a half or so, we have talked about some technical, we've talked about legal, we've talked about procedural issues. And all of these are directed towards one thing, and that's the protection of the public. However, how much talk has there actually been about the public over the past day and a half? Virtually -- well, Kent, a little while ago, talked about placing dumps in their backyard -- but other than that, there really hasn't been much conversation in that area. So today, we're going to address that issue through the media relations panel.

Let me introduce them to you. In this corner, weighing -- no, excuse me -- over here, we have Rob Burnes. Rob is from television station KULR, in Billings, and is based here in Helena. And of course you've already met Edwin Chen, from the Los Angeles Times. And on the government side of things, we have Ruth Simerly, who is with the Montana Department of Health, and Alec Hansen, with the Governor's Office.

What we want to do today is two things. Number one -- we'd like to provide you with some information about the government-media interaction, so that you can make up your own mind and set your own approach to this very important issue. And then secondly, we want to examine and explore some of the myths, some of the misunderstandings that take place right now so that you can be aware of them.

Let me tell you what we've done ahead of time in order to do this. To insure spontaneity and candid remarks on both sides, I haven't met the panel members. In fact, I've gone out of my way to avoid them for the last day and a half. Because what we want here is, we want their experiences. We want their information; we want their background. We want all of these things and we want them presented in such a way that it's fresh, that it's interesting, that it's not prepared and thought over so that it could be defensive, so to speak.

We're going to approach this thing in a number of ways to bring these points up. For example, let me start by quoting something that I recently read. There's a very interesting book. It's called, The Voice of Government, and it's edited by Hebert and Spencer, two college professors. And it's an anthology of a number of articles written by very distinguished people in the communications field. There's a segment, or one quote in this book, that really interested me, and it's this, and I quote: "In a democratic society, there is no more important principle than the people's right to know about their government, and the government's obligation to keep the people informed." Does anybody disagree with that? I doubt it. Because that is beautiful. That is a basic truth.

However, in times of catastrophe, in times of incidents like the PCB and others, there are some real-life situations that interact against that and cause us some problems. For example -- and in all cases, we're dealing with people and we're dealing with people's biases; we're dealing with people's strengths; we're dealing with people's weaknesses. At the same time, these issues have a lot of money involved. And whenever there's money, there's the possibility of controversy. Many of the issues that we're dealing with are not cut and dried; there's no "yes" or "no" answer to them, and they don't lend themselves to the printed or the electronic media as easily as we think they do -- "we" being on the government side.

Moderator: Victor Petralia, Director, Denver Area Office, U.S. Consumer Product Safety Commission, Suite 938, Guaranty Bank Bldg., 817 17th St., Denver, CO 80202

There's also the issue of liability. There's a bad guy around here somewhere, and the question is, who is it going to be? Sure as heck don't want it to be me. This kind of concern we all have.

And then at the same time, with all of these constraints, we still want to be fair. We want to do the best job that we can. There are a lot of good intentions on everybody's part. However, because sometimes we stumble around, we tend to create more problems than what we already have.

Let's set this up, now, if I can, with a bit of the exchange. And like I say, what's going to happen here is some spontaneity, hopefully, between all of our panel members.

One of the main problems that I have encountered in the government-media interaction are the pre-conceived notions that one has about another group. For example, let me talk to the press folks for a minute.

Could you tell me something about, not necessarily your own opinions, but what are some of the notions that the press has about the government? Both positive and negative. What do you feel? And by the way, on that side, if you have a pencil, take some notes on these, would you?

MR. CHEN: I think, perhaps, there is a tendency to think that there is some degree of incompetence.

MR. PETRALIA: Okay. Rob?

MR. BURNES: I think, more than anything else, is a belief that you guys are really trying to do a good job but don't know how.

MR. PETRALIA: Okay. That's a good point. What about the concern about, government doesn't want any publicity unless they control it unless it's good? Is that a real concern?

MR. BURNES: I think that's really a concern. I think what we -- the favorite term that I run into day after day is called, "agency position." That's not what the facts are. That's what the political expedient thing is to say.

MR. PETRALIA: What about the willingness not to take risks? Does that show up at all?

MR. BURNES: I think so. I think so, on a day to day basis, the managers, the administrators, are hired to take the risk and nobody else is going to do that.

MR. CHEN: I think there's a natural tendency of people, as individuals and institutions,to want to be seen in the most favorable light, including newspaper. What I meant by "incompetence," I didn't mean it to be a personal insult, but rather that the way of the bureaucracy that sometimes people in the media conceive as keeping down, suppressing any originality, innovative thinking and actions from becoming policy, or even introducing into the arena of public debate.

MR. PETRALIA: Okay, very good points. Do you have any other burning ones right now, or could I step to the other side? Let me come over here. Because just

like the people of the press have some pre-conceived notions about folks in the government, I think also, the government people have some concerns about the people in the press. Do either of you have anything that you'd like to mention, both good and bad, about how you perceive the press and their experiences?

MR. HANSEN: My problem is the pre-conceived notions themselves. A lot of times we have guys -- I've worked on both sides of this situation; I've worked in the press; I've worked in the government; I've worked in industry -- I guess three sides -- and when I was a newspaper man, I had some of the same feelings that those people have. As a spokesman for the government or spokesman for industry, I have a feeling a lot of times that the press -- and this is a natural function -- you're looking for controversy. You're looking for negative things. And this happens. They do have the feeling that there is suppression in government, that there is a certain degree of incompetence. And while they deal with their notions and we deal with with our notions, somewhere in there, communications gets lost. And in my position with the Governor here in Montana, and in other places where I've worked, I've tried to be as open and honest with these issues as possible and tried to get away from pre-conceived notions and try to deal with these things as openly as possible.

MR. PETRALIA: Are you saying, Alec, that they're looking for the scoop all the time, trying to build themselves, or help their ratings with the sales of newpapers?

MR. HANSEN: Well, certainly. That's a function -- we don't have a very competitive media situation in Helena, Montana. We have the AP, that handles a lot of the news; the United Press. They don't compete, like in a big city or a larger market where you have various news agencies, everybody's competing, trying to get a different angle on a story, and trying to get it first. We don't have that situation, so that problem of that market situation with the media isn't as prevalent in Montana.

MR. PETRALIA: Ruth?

MS. SIMERLY: I'd like to make a comment, since we are spontaneous. I am the token woman participant in this seminar. I'm glad I'm sitting in the middle, because this is generally where I am -- (LAUGHTER) -- in the government versus the press. I come from both a background of public health and journalism. And I think that some of the things that the gentlemen, here, are saying are true. Public information officers generally are --

MR. PETRALIA: Wait -- wait -- I don't want you to agree with them. I want you to tell me what the problems with the press are.

MS. SIMERLY: The problems we have with the press here --

MR. PETRALIA: Not here. Just the problems with the press in general, based on your counterparts everywhere across the country.

MS. SIMERLY: I think here it might be the fact that we are quite a ways away from a lot of the reporters that we're dealing with. It's easier to deal with someone here in Helena, than with a reporter down in Billings or out in Great Falls or clear out in Miles City. I think distance is some problem.

MR. PETRALIA: Let me ask you this. Do you think the press is capable of understanding the complex issues that are involved in some of the decisions that the agencies have to make in general?

MS. SIMERLY: No, I don't think they are, and I don't think they should be expected to. It's our job to make those complex issues understandable.

MR. PETRALIA: Okay. Are you taking notes over there? Good. Okay, do you have any other --

MS. SIMERLY: I do have -- let me tell you. There is one thing that kind of bothers me on something as complex as the PCB, where you will have a person from the press calling three different people hoping to get three different answers, and that can be a problem. It can be a problem, particularly if, indeed, there are three different answers, if at 10:00 in the morning the situation is quite different than it is at 2:00 in the afternoon or at 5:00 in the afternoon, and everyone is telling the truth, but the stories are entirely different. That is one of the problems we have.

MR. PETRALIA: Okay. Alec, do you have anything to add?

MR. HANSEN: Well, with regard to the experiences we had in Montana with PCB, the normal rules and the normal procedures, from my office, were suspended. If some reporter calls me up and asks me what the Governor thinks about a particular tax bill, I might not tell him, because maybe that's a card we want to play later that has something to do with the legislature. That's a whole different thing. That's political. This was not political. This was a question of public health. All of the rules were suspended in this issue. The responsibility here in our office and in Ruth's office was to protect the public as much as possible. No games were played. And this was a very serious, critical thing. We had to get information to the people that was available to us as quickly and as efficiently as possible. This wasn't a political game where you had guys sitting over here advocating one side, or people sitting over here advocating another side. This wasn't an issue. It wasn't a controversy. It was a problem, and in that situation, the rules were suspended.

MR. PETRALIA: Were you satisfied with the press coverage that you got?

MR. HANSEN: Yes, I was satisfied. I am not an expert in toxic substances and things like this. Most of the press relations on this issue with regard to the State of Montana were handled by the Department. I thought the Department did an excellent job. Initially, there was quite a bit of fear and suspicion among the people in Montana. A lot of people were very worried. We had a lot of calls in our office -- "I ate an egg. Is this going to affect my child?" We had calls from pregnant women, things like this. We tried to answer those questions as carefully and as honestly as possible, and I think the Department did an excellent job. After awhile, I think the Department got the information out to the people and I think that this fear and these other feelings were allayed somewhat, and I think they did a very good job.

MR. PETRALIA: Did you experience any cheap shots, that you thought --

MR. HANSEN: Not at all. I thought the cooperation of the press in this whole thing was excellent.

MR. PETRALIA: Ruth? Any cheap shots anywhere?

MS. SIMERLY: I have a little bit of different feeling on that. I think it's because we weren't putting out anything else. It was a long time before the government got their act together in terms of getting information out. And during that period of time, I think the press -- some of the headlines were worse than the actual story. The stories may have been quite accurate, but the headlines were misleading.

MR. PETRALIA: Okay. Let's do this, if we can. I'd like everybody to respond to the points that were brought up on either side. But not just yet, because what I'd like to do is get into a little bit of a role-play situation here so that we could demonstrate some of the problems that might exist. Okay? In order to do that, I'd like you to stick to the roles that you described, only -- (TO THE MEDIA PEOPLE) -- we'll make you guys the government -- (LAUGHTER) -- and you people -- (TO THE GOVERNMENT) -- the press. Okay, government, I'm on your side now. We're going to work together as a team, because we're three administrators and decision-makers in a department. And I come in to you guys, and I say, "You know what? The laboratory is finding some toxic chemicals in some food samples. What are we going to do?" So we discuss this, and we decide who we're going to call in and what-have-you, and we lay our plan of action. Okay, now, all of a sudden, I say, "What about the press?" Role --

MR. CHEN: I think I would want to know how much information is at hand and how much is coming in by the time we expect to meet with them.

MR. PETRALIA: Okay. All we have is one sample right now, and to be honest with you, I don't know what we've got. We've just goe one sample with a toxic chemical.

MR. CHEN: I don't think there's a black and white answer. I think that if you have one sample with 8,000 ppm -- (LAUGHTER) -- that might be different from 3.5 ppm.

MR. PETRALIA: Right. Rob, what do you think?

MR. BURNES: All right, to play the role, I think, as an administrator, the first thing I would say is, "Oh, let's not get the press involved. It's too early. We don't know how big this is --"

MR. PETRALIA: Okay, what do we want? We want more information? We need to get some more samples?

MR. BURNES: Let's get some more tests, do some field work. Let's check it out.

MR. PETRALIA: Right. Okay, I agree.

MR. CHEN: I think I'd just like to clarify -- (LAUGHTER) -- perhaps whatever the finding, the fact that we -- the agency is going out to look for something that's a little bit out of the ordinary perhaps ought to be known. I don't think that's very different, for example, from when President Carter sent a battleship to the Indian Ocean. That something is enroute because there could be some possible problem.

MR. PETRALIA: Okay. Well, see, all we have here so far is an abnormality in a sample. Okay, I see your point. Let me go on this other side, now, I'm going

to the press, here. Now I'm over on the press side. And I'm a cub reporter, and I come in and I say, "Hey, guys, something's up. I get wind that there might be a problem with a food source. And I hear that the health authorities are going out and they're starting to collect some more samples, and I think they have something. What are we going to do?"

MR. HANSEN: Well, the first thing you've got to find out is how the situation affects the people who read this newspaper. What is the threat to the public health and how are these people affected, in what way, what is the source, what should they watch out for --

MR. PETRALIA: Well, how are we going to do this?

MR. HANSEN: We should ask some tough questions.

MR. PETRALIA: Let's ask a tough question. Press, ask the government.

MR. HANSEN: What have you found out? (LAUGHTER)

MR. BURNES: All we've got is an abnormal report on a test. We don't think we've found out anything.

MR. HANSEN: Nothing at all?

MR. BURNES: Nothing.

MR. HANSEN: Do you perceive any threat to the public health?

MR. BURNES: Not at this point, no.

MR. HANSEN: Should people be warned?

MR. BURNES: I don't believe so.

MR. HANSEN: Well, what are you doing about it?

MR. BURNES: We're continuing to test.

MR. HANSEN: Are you following up on this thing? Continuing to test? When will you have the results? When can you answer the questions that I've just asked you? (LAUGHTER)

MR. BURNES: Well, I think before we go any further, we need to sit down and talk over and come up with some kind of an official agency position in response to that. (LAUGHTER)

MR. PETRALIA: Okay. I've been on this end of it. I know -- (LAUGHTER) -- Okay, what's your headline?

MR. HANSEN: There's a possibility that there's a time bomb ticking out -- (LAUGHTER) -- and these guys are having a staff meeting to develop an agency position --

MR. PETRALIA: Okay.

MR. HANSEN: -- blow them right out of the water.

MR. PETRALIA: A little audience participation. You two tables -- these two tables -- you are the public. You've just read the headline. What do you feel?

AUDIENCE: "What about my kids?" "What about my ducks?"

MR. PETRALIA: Okay, somebody's concerned about kids and ducks. Anybody else? Anybody have any feeling? What's the press -- I mean what does the public, as a consumer, what do you feel?

AUDIENCE: "Should I leave town?"

MR. PETRALIA: Okay, you have some concern. That's what I'm hearing. More audience participation. These two tables -- you're the producers. Let's assume this was milk, okay? You're dairy farmers. What do you feel?

AUDIENCE: "I'm selling my eggs."

MR. PETRALIA: Okay. In essence, what we came to so far is that good intentions -- good intentions by the government, because they have a potential problem, or maybe no problem. Okay, good intentions by the media because they are protecting your right to know, and they want to let you know as soon as possible about whatever is happening. However, because of a number of things, we manage to get ourselves into a difficult situation. Okay, let me back up if I can, now. Let's go back to the original comments one side has had of the other. And let me start with the government side -- I'll give you guys last shot. On the government side, what were some of the points, about the incompetency, and the agency position, and all that -- would one of you folks like to respond to that?

MS. SIMERLY: I think quite often we don't have all the answers immediately. We may possibly give that feeling, but I think it's better that we try to find out what's going on. I think Mr. McOmber brought that out this morning, when he said we really don't know what the dangers are to public health, and we look incompetent if we tell the media that, but that is really the truth at that moment -- we really don't know. And we do appear incompetent.

MR. PETRALIA: Alec?

MR. HANSEN: Well, some governments are incompetent. Certain agencies of some governments are incompetent. But for the most part, I think that governments in Montana and the places where I've worked and the things I've been associated with, I think that governments understand -- particularly in these kind of situations, understand their responsibility to the public. That's the function of government, to serve the public. Sometimes that gets forgotten, but most times, that is foremost. And in a situation like we experienced in Montana, like I said, no games were played. The critical problem at that time was to get the most accurate, honest information to the public as soon as possible, without creating any unnecessary fears but providing the warnings that were necessary, and in that function, I think government in this state and the federal agencies and various state agencies did a good job in this particular situation. You have no control over headline-writers. Ed knows that. Headline writers are a different breed. That's another story.

MR. PETRALIA: That's a good lead-in to this side over here, because what I heard them say a little bit earlier, and I may paraphrase a little bit, is the concern that I guess some of the folks in government have, about the only interest in the scoop, in other words, the ratings, the selling of the newspaper, maybe the prima donna complex, wanting to get more air time or column inches and so forth. Would you respond to those charges?

MR. CHEN: First, what Ruth said about when government agencies don't know something -- I don't think that's always perceived as incompetence. I think that the press, when there is something of a potential widespread health hazard, would like to know what is being done to find out the answers. So I think maybe it's too bad if the readers, the audience, the public is alarmed because the government agencies are gearing up for a potential health hazard, but I think the public ought to know that.

MR. PETRALIA: You think that that would not cause undue alarm?

MR. CHEN: I think if it does, it would perhaps only reflect the alarm that is being felt by the people who are entrusted to look out for the interests of the public.

MR. PETRALIA: But this gets down to that complex issue point that was brought up over there. Can the complex issue be filtered from them through you to the population as a whole in such a way that it's readily understood?

MR. CHEN: I think it can't -- it rarely happens. Forums like this -- you know, the police departments in the large cities all over this country are starting to meet quite frequently with the news media with lunches, with dinners, maybe only once a year or twice a year, so that they meet and get to know one another in non-stressful situations, so that when something very urgent happens, they have had some dealings with one another and that greatly facilitates the exchange of information, and that's been very helpful.

MR. PETRALIA: Very interesting. That's very good because, in fact, that's leading in to -- let's between ourselves think about some possible solutions or recommendations and then we'll take the remaining time and open it up to the audience. Ed, you bring up a very good one. What you're saying is, let's get to know the press in an arm's length situation. I don't think any of us ought to become buddy-buddy, but I do think in an arm's length situation, we get to know one another better, get to know what each other's limitations are, get to know what each other's problems are. I think that's very interesting. Let's talk about some other suggestions before the fact. In other words, before there is a crisis, besides getting to know the media, what else might you suggest? Anything? Anybody, now, we're opening up.

MS. SIMERLY: I'd kind of like to expand upon some of the difficulties of doing even that in Montana. First of all, we are a training ground here in Montana for many of our journalists and our electronic people working in there. We get to know them. We develop a good working relationship, and they are gone. It's a good suggestion and something we just have to work a little harder at in order to do it. And here we do have, in Helena, this opportunity, I think, to get to know each other, and we have Montana Press Women, the press club here in town, the American Women in Radio and Television -- there are those kinds of opportunities. I think the only problem we do have is the turnover in a state this size, of press people, and the government people -- it's not only on our side.

MR. PETRALIA: That's a good point Ruth, because we're dealing with two very transient professions here. The turnover both in government and in the media is just phenomenal, and if you heed this recommendation to stay in touch with your media folk and get to know them, it's not going to be a -- well, "once a year I'll

give them a call," because next year at this time, you're probably not going to be there, and there's a good possibility that he or she is not going to be there, either. So it's a constant thing that has to develop. Anybody else have any comments on this, on preparation before the fact?

MR. BURNES: I think a good example of what agencies can do is demonstrated by what's happening here today and yesterday. Good exchange of information. Two things went wrong as far as the media is concerned. Number one, there was an announcement of the conference. That was great. But no agendas were mailed to any of the media in town. I mean, a guy's got to pick a certain number of stories. He's looking at his time, he says, "Aw, there's a conference over at the Colonial. Have I got time to go over there?" Probably not. If there's a speaker he might want to listen to, and it comes at 2:00, and he says, "Hey, I got a moment, I'll cover it." The second thing, this afternoon, a reporter from one of the biggest newspapers in the state walked in and wanted to attend the conference to hear -- he didn't want to attend lunch or anything, he just wanted to hear what was going on, and stopped at the reception table, and they said, "No, you can't come in unless you pay a five-dollar registration fee." He's from the public. He was invited. You're charging him because you want to share information with him? I mean, that's how things can go wrong. So you have to be really cognizant of what you want to do, what kind of information, what kind of relationship you want to have with the press.

MR. PETRALIA: Okay, so we're talking about understanding, I think, of needs and problems of the press. And from what I hear -- let me paraphrase if I may -- the amount of preparation that you put into it is probably going to show itself with the result on the press coverage. Is that what you're saying?

MR. BURNES: I think that's very true.

MR. PETRALIA: Okay. Let me walk over here, however, because there's a tendency to go one step beyond that. I've seen too often in the government the chance to use the press for very self-serving nature. Some of the releases -- and you folks might want to talk about the reams of releases that you get on non-news. Is that a problem?

MR. CHEN: Only for the garbage. (LAUGHTER)

MR. PETRALIA: Okay. Do you want to elaborate on that? I think I'm speaking too much here.

MR. CHEN: I think most news media offices hire people who have rather lofty titles who do nothing but open mail and throw 95 percent of them away.

MR. PETRALIA: What suggestions would you have to us, then -- and this is before the crisis, again -- what suggestions would you have to us with regard to this kind of information?

MR. CHEN: I think somebody this afternoon mentioned the development of emergency response plan system. The existence, the development of such a system, ought to be made known, perhaps in informal meetings with members of the media, so that when PCB is found, the people in the media hopefully would know that there is such a plan and have some idea of what the government is or should be doing.

MR. PETRALIA: Ed, that's very good. This is completely spontaneous; yet he's following my outline very nicely. Do you have a copy? (LAUGHTER) Because now we start moving into what happens during -- all of a sudden, a crisis has come along.

And let's assume, now, that we have paved the way a little bit, because now we understand something about our media folks. We understand what they want to do and how they want to go about doing it. So all of a sudden -- bang! -- we're in the middle of some sort of a crisis. What are the things that government and media could do when we start getting into one of these situations? Anyone?

MS. SIMERLY: I think what you're saying -- have a plan and have an operation. One of the key issues in that plan is to get a media coordinator. I think we had an example this morning of how information sometimes gets left out. When Dr. Knight went through the list of all the people who've done everything in his Department, Information got left out there. That's not nearly so bad as getting left out in the beginning. Because if I'm the person -- or whoever it is -- we need to know in the very beginning what our role is. And in PCB, there was some confusion as to who was going to handle the media, and that was solved finally, down the road when I got involved with all the agencies.

MR. PETRALIA: So what you're saying is that during the strategic -- when you start saying, "Okay, these are the labs, and these are the seven cars from the Motor Pool, and these are the this and these are the that," then we also have to say, "Well, this is our media contact."

MS. SIMERLY: You're darn right.

MR. PETRALIA: Okay. That's a good point.

MS. SIMERLY: Right at that point.

MR. BURNES: I think there could be a problem with that, though. That's a nice, easy solution to what we see as a big difficulty among, you know, how you get the information out to the media. But there's a problem with that. And the problem very simply is, who's the media person? All right, Ruth, your background is in health and in journalism.

MS. SIMERLY: Right.

MR. BURNES: Okay, if I was a PIO for any one of the agencies, my background is almost totally in journalism. Who do I want to talk to, if I'm a newsman and I'm trying to find out about PCB? Do I want to talk to a journalist? Somebody who's working for a state agency? Or do I want to talk to a biologist, or a chemist, or somebody who actually knows what PCB is and can answer these complex questions that we're supposed to not understand, but we're sure going to ask? And that's why the media person does not belong in there without some kind of professional, expert help immediately available.

MS. SIMERLY: I think maybe we may have a little easier situation because of the nature of the people in my background in health, too. But I think here, too, Rob, if I put out any release or any kind of information, at the top is the name of the contact person who helped me write that release. And you don't have to call me at that point, after I sent something out. You know exactly who's the expert, who is the person who provided that. That may be another way of helping from other agencies, too, is that we do. We may do the coordinating, the cleaning out, the finding out who it is you should be talking to. And this is something an information officer in SRS or Education or anywhere can do, is do that kind of groundwork and let you know who you should contact.

MR. PETRALIA: Ed?

MR. CHEN: I'd like to expand on that. I think what both of you are saying would work quite well in non-emergencies. When something like the PCB happens, I think, as Alec said, all the traditional rules just go right out the window. Almost exactly a year ago, we had the accident at Three Mile Island, and President Carter sent a person whose name escapes me from the NRC to the plant and he ended up talking to the media every day, perhaps every hour on the hour, but a number of times every day. That prevented a lot of misinformation. It didn't stop all of the erroneous reports that went out. I think the point to be made is that, in absolute emergencies like Three Mile Island and the PCB here, the media can be the government -- I hate to say this word, but -- agent in getting out the information perhaps faster than any way you can do that, to not only inform the public of a possible health hazard, but to reassure them that it may not be as bad as some people portray it. I think despite the best efforts of this nuclear official who went to Three Mile Island, the New York Post, for example, one day ran a headline -- it was during the first week of the accident -- that was something to the effect that, "nuclear -- race on against nuclear holocaust," or something. There's nothing you can do to control what ultimately comes out, but assure that your input is accurate and, in these emergencies, quick.

MR. PETRALIA: Ed, you're suggesting to provide some round-the-clock, so to speak, updates as you go along, prescribed time, prescribed place, and so forth, and the reason for this -- I'll ask these gentlemen right now -- tell us something about the, what are they called, deadlines, datelines, or what-have-you? The press isn't a 9 to 5 job. For a newspaper, for example, you're talking about a morning edition. What do you have to contend with?

MR. CHEN: I think all of you from different parts of the country, from different cities, might well find out what different deadlines are. Different newspapers, even different editions have different deadlines. One of the most difficult would probably be Saturday afternoon or Saturday evening, because most Sunday papers are published quite early Saturday, sometimes even Friday night. If you had to call a press conference, I think sometimes you would do well to consider what those deadlines are, because the more time you allow reporters to have to digest the information, the better chances you'll have that the story is not inaccurate.

MR. PETRALIA: Rob, how about with the electronic media?

MR. BURNES: I think with the electronic media, it's probably even tougher, because in television, in our organization, we have three half-hour newscasts a day -- one at noon, 5:30, and 10:00. You tell me something at 9:00, I'm going to try to get it on my noon newscast. That's not much time, because we have to fly it down there and it takes two hours to fly it. So I think what Ed's saying is very important. The more time span you can give us, the more time advantage you can give the media to digest that information -- and we don't just digest it by ourselves in our little offices. But if I have a problem, I'll call Associated Press and say, "How did you read that statement? How do you understand that?" And we do that. We share that as a reporter. And so we'll try to give the best, most accurate picture as possible, but we need the breaks; we really do.

MR. PETRALIA: Does anybody else have any suggestions about during the crisis, what tips might help us out?

MR. CHEN: I have an idea. I don't know what the reception would be. I come from San Diego, and I think of a few weeks ago, we had some severe flooding which involved the evacuation of a major business and commercial district. In that case, the media, especially the electronics media, were allowed into the control room where the situation was being monitored up to the minute. So that

this information could get out to the people who lived in and around this area so they knew whether to pack up and leave their homes. Perhaps, as in a PCB situation, I wonder if it may not do so much harm to let a small group, perhaps a pool of reporters -- one or two representatives, who would then relay the information to the rest of his or her colleagues -- to let a few of those persons into the groups where decisions are being made, so that a better understanding of how decisions are being made and what are some of the considerations that must be taken into account.

MS. SIMERLY: Well, I cannot imagine that we wouldn't allow reporters into any meeting.

MR. HANSEN: I think that that suggestion has some merit in an emergency situation, whether it's PCBs, flooding, or whatever. First of all, I agree with your idea that there should be a procedure established. There should be somebody that the press can contact for information. Because in an emergency, something that threatens public health and safety, information is critical. Lots of times, information can be the difference. It's those things that you never expect. You have to be ready to react. I think the idea that Ed had of establishing a system in advance is very valuable. The media and public information plays a large part in that. When you're talking about the public, you're talking about their need for information to protect them. I think every possible accommodation should be made to the press to allow them to get the story to the people. And whatever that takes, without -- necessarily without interfering with the people that are going to have to make the decisions, that are operating under extreme pressure -- without those people having to worry about being exposed in a bad light under a very difficult situation. Guys might get in arguments; guys might use bad language; there's that possibility there. The press has the effect, many times, of putting a chill on the room. All of you people are probably aware of that. But without interfering with the important work that has to be done to deal with the situation, every possible accommodation should be made for the press to allow them to do their job, which is to get the news out to the public.

MR. PETRALIA: Okay. Let's assume this. Let's assume that the crisis is past, and we're back to the beginning again. Is there anything that we, as the government, or you as the press, think that ought to be done as an after-the-fact?

MR. BURNES: Well, I don't know as an after-the-fact suggestion, but I know what EPA did after the fact on the PCB thing. They held a conference and invited all kinds of officials all across the State of Montana, and it was held here in Helena, and they told us for the first time what PCB was, where it was found. And it was a long conference. They gave us more information about PCB than we had during the entire crisis, and the crisis lasted, what, five months? That's an after-the-fact thing that I don't really like.

MR. PETRALIA: Okay, that's a good point. Should there be, possibly, though, some sort of a recap? In other words, is it possible that a group from the government and from the press could get together and say, "Hey, look, this is what we've just been through. This is what I'm ticked off at. This is what I thought was great." And then see if there is an analysis of what transpired, because as it's been said over and over again in the last couple of days, it may not be PCB the next time, but it's probably going to be something else. Now, would that help?

MR. BURNES: I think that would definitely help. I don't think we need to always work in adversary positions. I think if we can sit down like we're doing

right now, or sit down across the table from anybody, and I'll say, "Gee, I didn't make that deadline because of this and these people did not get notified," and you say, "Well, because they didn't get notified, we had a lot of hell from them." We both can figure out what went wrong and work from there. I think it's a very great idea, Ed.

MR. CHEN: I do, too. Frankly, I was surprised, coming to this meeting, that there aren't more or almost any other local or Montana or regional news media people here. I think they are the ones who ought to be here and not me. The only other thought I have is that, often when the government agencies are unable, for whatever reason, to go to bat to provide information, what happens is, usually the charlatans and people who have some particular ax to grind will be the ones who are going to be heard. I'm thinking, for example, of the saccharine controversies and others, but it's in the nature of the media that, when they cannot get answers one place, they'll go somewhere else to get whatever the answers might be.

MR. PETRALIA: Let's open it up to questions from the audience. Anything -- yes?

Q MR. GOLDSCHMIDT: I'm Steve Goldschmidt. I'm from the USDA press office in Washington, and I worked on the PCB thing. I have one comment for Rob, his comment about public information people not being adequate sources of information. We had a situation last fall where reporters were calling, for instance, laboratory directors at USDA laboratories, who were in the midst of going through hundreds of samples, and were asking questions like, "Tell me everything you know about PCB." That's not helpful.

A MR. BURNES: I can appreciate that probably isn't helpful. Let me tell you about what happened with the PCB and KULR's coverage. We broke the story in Montana. Some field investigators from FDA discovered the samples in Idaho, and came to Billings, to Pierce, checking out that possibility. We happened to be working with KTVX in Salt Lake, broke the story from Billings at Pierce, with the field investigators. The field investigators told us more about PCB than we found out about it from anybody in USDA or any other place, for almost two and a half months. If we called the laboratory directors, it was because we were not getting the information elsewhere.

Q MR. GOLDSCHMIDT: I also have one question for you. I'd like to pin you down a little bit further on the first question, about when it becomes a story. On August 3, all we knew was that we had a contaminated dead chicken in Provo, Utah. And it was a week later that we were able to trace it to Ritewood Egg in Franklin, Idaho. And it was over a month later that we finally got the source traced down to Pierce, on September 16. At what point in that chronology does that become a story, and when is it helpful for the public to know?

A MR. BURNES: I think it would have been helpful for the public to know as soon as you traced it to Ritewood Egg in Idaho, because if there was contamination, and you suspected that that contamination merited further investigation, there's a lot of egg customers of Ritewood who would appreciate knowing what they were eating.

MR. PETRALIA: Anyone else? Oh, excuse me, Ed, did you have a comment?

MR. CHEN: I was just going to say I don't see anything wrong with letting the public know that one chicken in Provo was highly contaminated.

MR. GOLDSCHMIDT: It's not really a story when we have occasions like that -- vials of samples that come in --

Q DR. WHITNEY: How would you have reported that? I found a piece of fat in a chicken in a lab in San Francisco that had 15 ppm. Now, what would you say about that --

MR. GOLDSCHMIDT: Is that a story?

DR. WHITNEY: -- is that a story?

A MR. CHEN: No, I don't think so. But I would, as a reporter, stay in touch with you to see what else you're finding. If you find a second chicken, and a third, and a fourth, I'm going to be on your doorstep, wanting to know more.

MR. PETRALIA: Well, let me expand upon Neal's question for a minute, because it's touching upon something very interesting. Let's assume that in Neal's laboratory, he has not only chicken fat that he's running, but he's running a whole bunch of other commodities. Are you saying every time he runs across an abnormality we ought to pick up and call the press? Because just a few moments ago, we said, "Let us not be self-serving as far as dealing with the press, crying 'wolf' too often," this kind of thing. I know there's probably no answer to that.

MR. CHEN: I think it's a tough call. A lot of times we just have to go by instinct.

DR. WHITNEY: Let me give you a further example. There's a large producer in Idaho. He had a lot of hogs at slaughter. They were in one of my laboratories. A gal from Idaho called me and she asked for the results. And I said, "Well, I don't give anybody results until they're official." And she said, "Why aren't they official?" I said, "They've only been screened." She said, "Well, if you've screened them and you've found something, does that mean that they could be condemned?" And I said, "The possibility exists they could be condemned." The next day, a story came out in the Idaho press that this particular producer had a whole bunch of hogs that most likely were going to be condemned. Now I asked her -- I said, "Please don't report that kind of stuff because that's not accurate until we have an official result." This is my major problem in situations like this. It's a subjective interpretation, I think is really a distortion, when you try to give someone facts, they get it blown all to hell. And I'll tell anybody anything that's public information, but I'm not going to give out information upon which someone can speculate and damage either an agency or a producer who's trying to sell something, or scare the hell out of the public for no reason whatsoever.

MR. CHEN: Well, let me ask you this: If you were a scientist for the Tobacco Institute and I came to interview you about the hazards of tobacco, and you tell me, "Well, the jury's still out," as you well might if you were on the payroll of the tobacco industry. Now what would I do in a situation

like that? Just because you tell me that the jury's still out, I'm not to write a story? It's a tough question.

DR. WHITNEY: I can't speak for industry with respect to government. I've got to tell you what's fact. Because if not, you'd make an FOI request and in ten days you'll get it anyway. We got requests under FOI for everything that existed on PCB. I just emptied my files.

MR. PETRALIA: What's happening here is, we've come to the crux of the issue, because all of the points that we have built upon to get to this point are now coming to play with this type of incident. Could it have been that preparation with that reporter ahead of time may have resolved the problem? Maybe, maybe not. Because what if it was that reporter who was only interested in furthering his or her career getting the scoop at all costs? You don't know. These things all come into play, and what you're going to have to do, in my opinion -- and I'll interject here someplace so we can keep moving along -- is that you have to first rely on the professional aspects of all people involved. Now just as there are probably going to be some people who are less professional or less ethical, whether it be in business or government, I would imagine that we might have the same kind of feeling with someone in the media as well. Personal opinion. Yes, Jon?

Q MR. YEAGLEY: Jon Yeagley, of the EPA. By way of being something of a Devil's Advocate here, if we're getting down to the point of using what is almost raw data out of the laboratory to develop press out of, and we get these scary headlines, and we come back two or three days later and determine that lab screwed up, let's say, the sample wasn't taken properly, whatever, and a retraction is necessary. How do we get the retraction off of the 75th page and back out into the headlines?

MR. PETRALIA: There's not a loaded question in the audience. (LAUGHTER)

DR. WHITNEY: Now, that happens.

MR. CHEN: Oh, sure, it happens.

DR. WHITNEY: It did happen. And we almost closed down Minnesota turkeys a week before Thanksgiving.

A MR. CHEN: That question is perhaps one of the most frequently debated in the newspaper business. Some editors advocate that a retraction, a correction of an error ought to appear in the same place and with the same size headline as the original story, but I've never seen that happen. (LAUGHTER) Some papers -- quite a few I can think of -- do have, usually on page 2 or page 20, some designated spot that's marked "correction," or "oops," or something. (LAUGHTER) I sympathize with you. I think that is not fair.

MR. HANSEN: We have a news agency in Montana that has a policy of not printing retractions, and they just incidentally happen to be the news agency that makes the most mistakes. That's a real problem. That's not you, Rob.

MR. GOMEZ: LeRoy Gomez, with Food and Drug Administration in Denver. At the height of the PCB crisis, I was fielding anywhere from 20 to 40 media inquiries a day. I have to make an observation, one that incompetency is not limited to government. So I found that I was giving some reporters a basic

introduction to PCBs. Your comment about the fact that the hazard of PCBs was not shared with anyone perhaps bears some modification in that, in the first week, right after the incident began, the Food and Drug Administration issued a statement -- and this was issued to AP, UPI, as well as governors of the various states -- explaining the situation with PCB. My question, really, is this: When I have limited information, for example, preliminary results of analyses, and I refuse to give these out -- because in our work we wait until we have confirmation to make sure that the information is accurate because if we do not, then an awful lot of people can be unnecessarily alarmed or damaged or hurt. My question is: When I refuse to give out that information, why am I quoted as saying -- "We requested the information, and Food and Drug Information, or LeRoy Gomez, refused to give out that information?"

MR. BURNES: LeRoy, do you say "refused" when you answer the question?

MR. GOMEZ: Yes, I refuse the information.

MR. BURNES: Do you -- I guess what I'm trying to postulate, here, is that, if you said, "We have some tests, and we're re-testing to check their accuracy," do you think that you would be quoted as saying that?

MR. GOMEZ: No, I'm not quoted as saying that.

A MR. BURNES: If you're not quoted as saying that, then we, as Vic just said, we have problems in our industry, too.

Q MR. GOMEZ: Yes, I recognize that. And my recourse is to call up the reporter and say, "Hey, here's what I told you and here's what you printed and that's not correct." And I recognize the gamut of the various questions that we're asked. And a number of times, I did call up reporters and say, "Hey, what right --" there were some reporters that I thought acted very responsibly in that they would call back sometimes to verify the information, or if they had talked to someone else, to get our version of it, rather than just print the story. The related issue is, we give the position, our scientists, the FDA scientists, those that we go to to explain the hazards of PCBs, and we give that information out. And then the story breaks based on an interview with a local health officer in Timbuktu who says, "You've got to eat 400 eggs a day in order that there'd be a hazard," and he's got no real scientific base to do that, but that is given the same weight and the same credibility as an official study and research position.

A MR. BURNES: I think one reason that might happen -- and I'm just guessing, now, because I don't like the way the answer feels -- but I think because a person is alive and he's standing there in front of you, that the media has a tendency to give him more credibility than an agency that exists in some bureaucracy, be it in Denver, 'Frisco, or Washington, D.C. That's unfortunate, but that's part of the problems that we're talking about here today. A second thing, too, you mentioned you had the first test reports, and this came early. We had the first preliminary test reports. Should we talk about that dead chicken? Well, I don't know -- Ed said it probably wasn't a story, and I agree, it was probably not a story. And somebody said, "Hey, we found a dead chicken." -- (LAUGHTER) -- all right, but --

DR. WHITNEY: In the Washington Post. it was a story.

MR. BURNES: That's each individual editor's choice. However, if somebody from the health department would have contacted me and said, "Hey, we found a dead chicken. We don't know what it was but we think it might be something like this, and while we don't really want a story on it, we just want to background you on it in case it develops," I'd be perfectly willing to sit down and work with that guy and find out everything I can possibly know about that subject, just in case it did develop, and it might just prove out that it didn't develop, and I would have wasted a whole afternoon. And that's not the first one I've wasted doing it.

MR. PETRALIA: That's assuming there was preparation and trust and all of these things ahead of time. We've come to just about 59 minutes on the program, here, so we're going to have to wrap it up. I'd like to close with one comment. And that is, that those of us sitting around tables here are -- with the exception of one or two -- we are scientists, we're managers, we're administrators, we're physicians, we're veterinarians. This is all new, and this is scary. And as a result, when we get put into situations that we're uncomfortable in, maybe we don't perform as well as we do behind that laboratory bench or moving that stack of papers from the right to the left, or what-have-you. But it's a fact of life when you get to positions that you are right now, and those positions are in the public trust, then you have to expect to be exposed to the media and give the story to the public. So I would suggest that if we learned anything out of this last hour besides the recommendations and whatnot, it's to recognize that point and accept it, and then develop the expertise that is necessary so that you can get your point across, so that you can get it across in a way that it's believable and that it's clear and that it can be transmitted to the public. And with that, I'd like to thank the panel very much, and thank you.

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LEGAL PANEL

The next panel we have has been somewhat difficult in organizing, because I don't know whether our lawyers are all more busy than anyone else, or whether they feel that they really need to do a great deal of research before participating in a panel that relates to the legal matters. And I think that's a good part of it.

We do have three people who have agreed to expound on some of the matters relating to legal -- one is Fred Nelson, who is with the Attorney General's Office in Utah, who will speak to some of the matters of disposal. We have Charles Brown, from the Livestock Sanitary Board, who will relate some of the problems we had with the PCB situation. And LeRoy Gomez has agreed to talk about some of the problems relating to voluntary disposal, which we ran into some problems in Montana, and really had some problems trying to decide how we could accept the results of the federal samples and take legal action on it, and things like this. Would you gentlemen please come up?

That last panel -- I don't know if we can match that. That was tremendous. We probably should have ended on that note -- thank you very much, Vic, and the members of your panel.

However you'd like to proceed, you may.

MR. GOMEZ: Inasmuch as we were involved in the investigation from the very beginning, one of the first things that we had to determine was what tools we had, what alternatives there were. Inasmuch as we're a federal agency, we are limited in terms of jurisdiction over those products that are in interstate commerce.

Moderator: Vernon E. Sloulin, Chief, Food and Consumer Safety Bureau, Montana Dept. of Health & Environmental Sciences, Cogswell Building, Helena, MT 59601

That means that if they go across the state line, either being shipped out to any particular location or coming into a particular location, crossing a state line, then the Food and Drug Administration has jurisdiction.

It was relatively simple for my colleague in Region X, Jim Swanson, inasmuch as most of the products were going out from the State of Montana, out to the other states, and so they had primary jurisdiction because of the interstate commerce. Where we had complications was where products were within the State of Montana, because the meat and bone meal was produced at Pierce Packing and was generally distributed to manufacturers within the State of Montana, manufactured into finished feeds, and then to animals.

We recognized that the U.S. Department of Agriculture has the jurisdiction over meat and poultry. There is kind of a split jurisdiction when it comes to eggs, in that they have jurisdiction over eggs that are in egg processing plants -- egg breaking plants. We have jurisdiction over shell egg plants. Congress, in its wisdom, saw fit to break that up in that fashion.

We, in Food and Drug Administration, were originally advised that we did have jurisdiction over shell eggs in intrastate commerce because of the Egg Products Act. But that position was later modified.

The situation that developed was that, once the extent of the contamination was found, then we went to the manufacturing industry and obtained their cooperation in going out and recalling all the manufactured feeds, or those that were available. Then we ran into the problem of eggs. The problem with eggs being, again, one of jurisdiction. The State of Montana legislation is such that if they order destruction of a particular product, they are required to provide indemnification. Funds are always a consideration and a concern in the investigation, particularly from the standpoint of the State. We, therefore, had to develop a system of encouraging voluntary compliance, and I think we were quite fortunate in two respects. One, we did get the cooperation of most of the people

in Montana. Also, Montana does not have any significant egg-breaking production. Because if we had had to start tracing foods which were manufactured using eggs coming out of Montana, the problem would have been multiplied many, many times.

The other situation is that, in the State of Montana, the law requires that the analyses be performed by the State. So even though Food and Drug Administration had performed the analyses on a number of samples, in the event of a contest, the State of Montana would have had to provide evidence that they, themselves, had performed the analyses. The way that we finally overcame that was by the issuance of a bluff letter, in effect, by the Food and Drug Administration, under my signature, which advised the egg producers that if they shipped those in interstate commerce, that the Food and Drug Administration would descend upon them with its total wrath. The situation was, of course, that very few of the eggs were, in fact, shipped interstate and were being shipped intra-state. But that letter served the purpose of providing the appropriate motivation to get voluntary destruction among those people who might have been somewhat reluctant to do so.

The other factor was that there were some firms that were not as cooperative, and the State of Montana was able to pursuade them to destroy their eggs.

I guess, in summary, what I'm saying, what we learned from this particular episode is that FDA does have some jurisdiction when we get into an intra-state situation. However, what I would recommend is that all of you people who are here in the state go back and take a look at the laws that you have on your books and compare them to the PCB situation we had here in Montana, and see whether or not your laws are adequate to deal with that situation. I know that Montana has engaged in that kind of review and is going to be making recommendations for legislative changes to fill in some of the gaps that were encountered.

MR. BROWN: In many respects, he said the basic things I would say relative to Montana's experiences. You know there were three agencies primarily involved

in this, each with somewhat different, but also somewhat overlapping jurisdictions. The Department of Livestock's involvement finally ended up primarily with the hogs, although we do have jurisdiction over eggs, to some extent. The Department of Agriculture was primarily concerned with feed. The Department of Health was primarily concerned with the public health aspects.

As Mr. Gomez has pointed out, our review of the statutes put us in a little bit of a difficult position. Montana does not have sovereign immunity. Its recent Constitution eliminated much of that kind of protection from agency wrongdoing, or what is perceived as agency wrongdoing. And so we had to move very carefully. It was pretty apparent pretty early that the damages in this thing could amount into the millions of dollars, and one of the things that we were attempting to do was make sure that whoever's pocket got tapped, hopefully, it wouldn't be the State's.

As we analyzed our laws, we found that our hands were tied in certain respects. For example, the Montana Department of Livestock's operative statutes were basically enacted in 1921, well before there were very many concerns about toxic substances and their impact upon the public health. Our statutes are couched totally in terms of livestock disease, and in fact, they're talking in terms of the infectious, contagious, communicable, dangerous kinds of livestock diseases. It was our analysis that the PCB toxicity didn't rise to the level of a disease, so our quarantine statutes weren't very good for us. There was no disease; therefore, there was no legal authority to quarantine. If we did quarantine, and somebody suffered loss as a consequence of our quarantines -- say, we moved on laboratory data that was incomplete, or some other such thing -- then we would be liable. Our liabilities would also arise because if the Department of Livestock orders the destruction of any property or animal because of problems with disease, the statutes made it very clear that we pay for those animals or that property that's been destroyed. And we didn't have the money to do that, and

because we didn't have the authority to quarantine, we were just really kind of between a rock and a hard place. What we've been blessed with up here, by and large, are some extremely cooperative producers and individuals who were willing to go along on the basis of bluff, in some instances, and just on the basis of just plain, "We'll do what's right, even though it may cost us."

One other thing that we attempted to do, that should be mentioned, too: There were, of course, people who were actively affected by the PCB contamination. They bought the feed that went into the chickens or the hogs that had their chickens or their hogs showing up as having excessive amounts of the substance in their fats, or whatever. But there were many, many, many more who were not actively affected by it. They were indirectly affected by it just as badly, though, because most of our hog production, for example, does go out of state. There's quite a bit that Pierce does, but a good part of our hog production goes to the West Coast. And just to have the name, "Montana," attached to your hog meant that your hog was not going to move to market because everyone was running very scared. And one of the things that our Department did in conjunction with the Department of Agriculture was to set up a certification program so that we could eliminate from concern those producers who were not actively affected by the contamination, those producers who could prove that their feedstuffs had not been involved with any of the material that originated with Pierce.

In kind of a summary, we are analyzing and trying to determine what kinds of things we would like to see changed, so that we can better handle something like this again. And we will undoubtedly have some proposals for the 1981 legislature to affect those kinds of changes.

MR. NELSON: I'm in a most enviable position: The last speaker on the last day, the last half hour. I was asked to address the subject of legal problemss associated with establishing a state-operated or local government-operated hazardous waste disposal facility.

Let me set the context of what I am going to say to tie it into what's been said so far. I'm talking about the circumstance where either under RCRA, of establishing a disposal site, or the problem of where you have 2,000 cows that need to be disposed of. What procedures do you go through? What kinds of legal problems are you going to have in disposing of those kinds of wastes?

In looking at state statutes and general state authority in this area, most states are not in the same position that Oregon is. In fact, in the Western states, most states' statutes are very deficient in this area. Some kind of legislative authority will have to be looked at, and the extent of that relates to a couple of separate issues.

The first is the ownership of the site. The first thing that will have to be looked at is, where do you locate the site and who's going to own it? Which automatically means you either have to go to private land, state land, or federal government land. Private land means condemnation; it means appropriation of state monies; it means the obtaining of an authorization through the state legislature to buy that land. So immediately you're thrown into the legislative posture. If you go to state lands, you may already have some state lands which are available, but you would still have to go through probably the administrative board which deals with those state lands to get approval to use that for that purpose. And in addition, usually on the state level, in using state lands, there is a relationship between the different governmental entities which may mean that you would need an appropriation even to use those state lands. If you use federal lands for the disposal as was commented on earlier, the first major hurdle is getting the agency approval. Assuming you can get the easement, the lease, the right-of-ways -- assuming that all that can be done, then you're faced with the federal problem of doing an environmental impact statement, which most undoubtedly would have to be done for establishing a hazardous waste facility on any kind of federal property.

So you can see the legal issues dealing with ownership of land are quite significant.

As to operation of the site, you're faced with similar legal questions. You have to have legal authority and a legal structure set up in your statute so you can operate your site. That means you have to have an authorization statute and you have to have an appropriation to do it.

The next question is, how do you fund that site? And more than likely, you're going to either establish some kind of a fee system for individuals bringing wastes into the site, or you're going to have to have a direct appropriation. In either case, you would have to have legislative authority. In the State of Utah, for example, there's a constitutional provision that says that any fee must be set by the legislature. So you're going back to the legislature at that point to establish the fees that would be required of people bringing their wastes into the site. You can see the problems with doing that kind of a thing.

Finally, there's also, in operation of the site, there would have to be legislative authority to deal with the issue of long-term commitment, of taxing, funding for the site, any taxing authority that would be given.

Now, assuming you've solved your legislative and legal authority problems to establish a hazardous waste site, then you move into the process of actually doing it. And at this point, the problem of political ramifications of establishing a hazardous waste site for a governmental entity are much greater than for a private, in my opinion. A private entity can establish a hazardous waste site easier, as far as the public outcry is concerned, than a governmental entity, for two reasons. Number one, because you have had to go to the legislature to establish a state hazardous waste site or a local hazardous waste site, you've been in the public forum. You've already had news media coverage and generally, when you're dealing with these kinds of issues, the more news media coverage you get, the worse the problem gets, the more people that come out of the woodwork.

If you hold four different meetings, you get three at the first meeting, 25 at the next meeting, and 4,000 at the last meeting, simply because more people become involved in the issue. There's more problems to deal with in establishing that site, as far as determining the -- when it's in the public focus by being placed in the meeting in the legislative forum, you get much more input from a number of different segments. Now, that may be good, but it compounds your problem of actually getting on-line with your site.

In addition, you've got open meetings laws in most states. And as soon as you start in the regulatory process in establishing hazardous waste sites, you've got to deal with those open meetings laws. A private agency doesn't do that. They sit down in their back board room and they work out the engineering plans and they figure out exactly what they'll do and then they issue a press release. But that's not done, generally, with a governmental agency. You do have those back workroom sessions, but when the final decisions are made, under open meetings laws, that decision has to be made in a public forum. And in our state, in the State of Utah, the regulatory body making a decision on the siting of a hazardous waste facility would have to do that in an open, public meeting. The discussion of the ramifications of it, the details on the engineering, the approvals would all be done in the open public forum. Again, that may be good, but it compounds your problem.

Another issue that has come to the forefront most recently is the problem of which entity should be responsible. Local governments in some states have paired up against state and federal government in establishing hazardous waste sites. A prime example is Wilsonville, Illinois. An EPA-approved, State-approved hazardous waste site was eventually closed because of local pressure. I don't know what the status of that is today. But you have a local government entity which, after that whole approval process had been completed, stepped into the

forum, and even though all the legal requirements had been met, the local government proceeded and very efficiently closed the site, even though it was run -- based on the information that I see in the news articles, even though it was run in accordance with every environmental standard that was known, it was EPA-approved, it was still shut down.

You also have the boundaries issues, legal issues that come up. In 1978, the Supreme Court decided a landmark case on interstate transportation of solid wastes. The State of New Jersey passed a law which prohibited importation into the state of solid wastes. That was struck down by the Supreme Court as being unconstitutional and a violation of the commerce laws. What was represented last night -- is it Billings? -- that has just passed an ordinance to not allow the transportation of radioactive materials through the city. The legality of that is seriously questionable. And I assume that that will be challenged. Those issues will now be coming to the forefront. What the Supreme Court did not decide in 1978 was the issue of: Can a state or a private entity, if they are open for public business, prohibit wastes from coming into the state? Hazardous wastes? The issue that New Jersey dealt with was a flat-out ban on all solid waste coming into the state.

But the issue still remains as to: What if your facility is not capable of handling it? What if Oregon gets to the point where the volumes are such that they are not capable of handling the waste? How are they going to deal with that problem? Are they going to be selective? Are they going to charge a higher fee? As in Fish and Game licenses -- you charge a higher fee for someone coming from out of state than you would for someone in-state.

All of those issues will need to be resolved. And the significant issues which, as this hazardous waste program comes on line, will have to be resolved in the courts, and I assume that there will be enough vocal interest by local governments where these disposal sites are going to have to be sited, that those issues will be decided in the next short time period.

Now, let me conclude by just stating that there is, obviously, the final issue -- the liability issue -- in running a state or a local hazardous waste facility. Most states have sovereign immunity. And what that means is, you cannot sue a governmental entity unless they give permission to be sued. Many states have waived that requirement under certain circumstances, but the legislature would have to deal with that issue with respect -- most legislatures -- Montana, apparently, has a broad waiver -- but the State of Utah would have to deal with that issue, and most states would have to deal with that issue in a legislative session, as to which claims would be allowed, under what circumstances, what are the limits on the claims, what standard of liability -- are they going to apply strict liability versus negligence standard, which was discussed a little bit earlier today -- and how far do you extend that liability? Do you extend it to the generator; do you extend it just to the disposer? And where are -- the ultimate questions of -- under the federal program for radioactive waste and radioactive accidents -- the Price-Anderson Act established a liability limit. The state would have to deal with the question as to whether they want to try the same kind of thing if they were to go into the process of dealing with hazardous waste disposal.

My conclusions are, it's probably easier for the private industry -- although it's going to be very difficult for private industry to establish a hazardous waste site, it's probably easier for them to do so. That doesn't mean state or local government shouldn't get involved in that kind of a process, but there are significant legal issues that are going to have to be resolved before that process can be complete.

MR. SLOULIN: Any others of you -- any comments before we ask the questions?

MR. GOMEZ: Yes. There's one area that I did not address, and that had to do with small lots, or the individual producer program, and it's something that

I think we should all keep in mind, when this kind of incident occurs. And that is, what can we do to assist the direct consumer, those people who have small lots of contaminated goods -- particularly in Montana, there's a lot of concern with where individual farmers, small producers, would raise chickens, sell eggs to their friends, or for their own consumption, butcher their own hogs -- and they're very concerned about not only the status of their herds, but also, what about the meat that was in their freezer, and that kind of thing.

I think it was successfully attacked in Montana, primarily because of the good graces of the Department of Agriculture in providing sampling and analytical service to those individual people who had small lots. I think that, because of the public concern, everyone who would be involved in that kind of episode is going to have to take into consideration what kind of services -- even though there may not be any legal jurisdiction -- what kind of services we can provide or should provide to individual consumers or small producers.

MR. SLOULIN: Any questions? (NO RESPONSE) Well, thank you very much.

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SUMMARY AND RECOMMENDATIONS

Thank you, Mr. Chairman. On behalf of the Montana departments, I want to thank everybody for their participation and the open and candid exchange of ideas during the past two days. I think this was the highlight of the meeting, and I would just like to share with you some of my personal reflections concerning the meeting and summarize as best I can some of the topics in which there was concensus.

All of us, as individuals and as individual agencies, knew before coming to this seminar that the subject area of toxic waste and chemical contamination is an extremely complex and difficult to, first of all, prevent, and secondarily, solve, once there has been a spill or point source contamination.

The second point is, the importance of the multi-disciplinary and multi-interests represented at these types of meetings are not only beneficial but are absolutely necessary to address the present known problems to arrive at solutions. The speakers and the panels did an excellent job in identifying most of the issues that are of concern to us.

This meeting led to two very beneficial benefits. First, in the specialized disciplines represented here yesterday and today, we were all guilty of talking within our own inner circle, talking to each other and telling each other what we wanted to hear instead of listening to the existant problems. This has been, throughout my career, the pattern. I think it's only very natural. But secondly, by meeting together with these kinds of forums, in these kinds of meetings, the multi-faceted and multi-disciplined groups, we have achieved one of the major goals that Governor Judge so adeptly identified yesterday -- we were afforded the opportunity to get to know each other, thus precipitating in what I consider very important to trigger the chain reaction needed for addressing the problems

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of chemical contamination. In this chain reaction, the initial event that has to occur is to establish a mutual trust. When trust is available, when we get to know each other, communication will result from this. This, in turn, leads to cooperation, then to the operational procedures which on to the bottom line, is resolving the problems.

I think we've made a great step forward. I think this is the first of many meetings that should take place throughout the United States to address these very complex problems. In the past two days, we have, hopefully, accomplished much in developing trust and communication. I've come away with many new thoughts and ideas and approaches to the problems. I hope that all of you experienced some of the same type of reaction.

This meeting established concensus and recommendations on the following topics, and they're certainly the broad ones. There were many other things, but to me, these are the highlights of this meeting.

Number one, we established communication and coordination between agencies. We've identified the need to continue identifying the issues. I think this will come in time.

Number two, we continue to pursue the goal and recognize the importance of preventing chemical contamination in the environment. This has to be the highest priority to all of us concerned in this room.

Three, we want to establish and expand the present capabilities available into some type of an emergency response team that encompasses and involves all levels of government, into state, regional, and national organizations, in order to address the problem of correcting contamination spills. Some positive output, which is already in motion, is that at this time, the state agencies of Montana have already agreed today to meet within the next month with EPA, FDA representatives, and hopefully other interested agencies such as USDA, to develop an emergency response team or system which can be operational and evaluated and updated as new areas are needed.

Number four, each state must address the problems of hazardous waste collection sites and also hazardous waste disposal sites. The need for increased emphasis of this subject was stressed by one of the moderators, that this subject should be expanded to an entire conference itself, since it is much too complex to compress into a forty-five minutes to an hour discussion. I feel the comments to be well taken and heartily endorse that suggestion, because these are going to be the crucial issues that are facing us, once the new regulations are coming out for all of the states and regions to implement.

And finally, the objectives that were identified here today that are far from being resolved are the legal questions of the last panel concerning both indemnification and liability. As Don Healton so aptly stated yesterday, these are questions that society must address and resolve in the future.

This concludes the summation.

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